NATIONAL FRUIT AND CIDER INSTITUTE,

LONG ASHTON,

NEAR BRISTOL.

REPORT

FOR THE YEAR

1910.

BATH:

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xii. 15.

The National Fruit and Cider Institute

LONG ASHTON, NEAR BRISTOL.

REPORT OF THE GOVERNORS

To the Eighth General Meeting of Governors, Members and Associates to be held in the Council Pavilion of the Bath and West and Southern Counties Society, Show Yard, Cardiff, on THURSDAY, JUNE 1st, 1911, at 2.15 p.m.

Governors of the Institute :

ACLAND, Sir C. T. DYKE-, Bart., (Chairman)
BAKER, G. E. LLOYD-
BIFFEN, R. H.
BUNYARD, G.
COOKE, C. W. RADCLIFFE-
DAVIS, HERBERT J.
DYSON, GIBSON
ELLIOTT, Sir THOMAS, K.C.B.
GIBBONS, H. H.
GRANT. W. J.
GRENVILLE, R. NEVILLE-
HOBHOUSE, RIGHT HONOURABLE H.
HUNT, A. E. BROOKE-
MATTHEWS, HENRY
NAPIER, H. B.
OSBOURNE, J. S. SMYTH-
RILEY, JOHN
SILLIFANT, A. O.
STRACHEY, Sir EDWARD, Bart.
TAYLOR, MONTAGU C. H.
WATTS, JAMES
WHEELER, E. VINCENT V.
WOLLASTON, G. H.
WOOTTON, JOHN H.
(One Vacancy).

Managing Committee :

NAPIER, H. B. (Chairman)
COOKE, C. W. RADCLIFFE-
GRENVILLE, R. NEVILLE-
HUNT, A. E. BROOKE-
OSBOURNE, J. S. SMYTH-
STRACHEY, Sir EDWARD, Bart.
WATTS, JAMES

Members :

ACLAND, Sir C. T. D., Bart. Killerton, Exeter.
AMORY, LUDOVIC H. Knightshayes Court, Tiverton.
APPERLEY, H. W. Sandlin, Leigh Sinton, Malvern.
ARCHER, JAMES. 16, Charleville Circus, Sydenham.

BAKER, G. E. LLOYD-. Hardwicke Court, Gloucester.
BATTEN, H. CARY (Colonel). Leigh Lodge, Abbotsleigh, Bristol.
BERKELEY HUNT AGRICULTURAL SOCIETY. Berkeley, Gloucester.
BIFFEN, R. H. The Gables, Histon, Cambridge.
BIGGS, A. C., Manager. The Biggs Fruit and Produce Co. Ltd., Burlington, Ontario, Canada.
BOND, E. W. Hele, Cullompton, Devon.
BREWERS' EXHIBITION (ARTHUR T. DALE). 46, Cannon Street, London, E.C.
BRISTOL & DISTRICT MARKET GARDENERS' ASSOCIATION. The Grove, Fishponds, Bristol.
BULMER, E. F. Ryelands, Hereford.
BULMER, H. P. Ryelands, Hereford.
BUNYARD, G. Royal Nurseries, Maidstone.

CHEVALLIER, J. B. Aspall Hall, Debenham, Suffolk.
CHILDS, CHRISTOPHER. Boscarn, Love, R.S.O., Cornwall.

Members *(continued).*

COOKE, C. W. RADCLIFFE-. Westbury, St. Andrew's Road, Great Malvern.
COUTTS, H. BURDETT MONEY. Stoodleigh Court, Tiverton.
CRAWSHAY, Captain F. W. Hempnall House, Hempnall, Norfolk.
CURRE, W. E. C (Colonel). Itton Court, Chepstow.

DANKS, R. M. Charlton House, Hartlebury, Worcester.
DART, C. Broadhembury, Honiton, Devon.
DAUBUZ, J. C. Killiow, Truro, Cornwall.
DAVIS, HERBERT J. Sutton Montis, Sparkford, Somerset.
DOWDEN, J. MOSTYN. Messrs. Dowden & Pook, 41, Bermondsey Square, London.
DURHAM, H. E. (Dr.) Sunnyside, Broomy Hill, Hereford.
DYSON, GIBSON. Brockhall, Leominster.

EDGELL, HERBERT. 42, Hanway Street, Oxford Street, London, W.
ELLIOTT, Sir THOMAS H., K.C.B. Board of Agriculture and Fisheries, 4, Whitehall Place, S.W.
ELLIS, HENRY ARTHUR. Highman, Gloucester.

FARWELL, E. W. 11, Laura Place, Bath.
FLETCHER, E. Hazeldine, Rydes Hill, near Guildford.
GARTON, J. W. Clarendon Park, Salisbury.
GIBBONS, H. H. Church Farm, Clutton, Bristol.
GILBEY, Sir WALTER, Bart. Elsenham Hall, Essex.

GRANT, W. J. County Council Offices, Newport.
GRENVILLE, R. NEVILLE-. Butleigh Court, Glastonbury, Somerset.
GREW, JAMES. Co. Armagh Cider Co., Portadown, Ireland.

HANCOCK, H. C. The Court, Milverton, Taunton.
HART, ALEX. Brooklands, Blackburn.
HAYDON, H. COURTENAY. Chettiscombe, Tiverton, Devon.
HILL, E. H. Broadwas Court, Worcester.
HINCKES, R. T. Foxley, Hereford.
HOBHOUSE, RT. HON. H. Hadspen House, Castle Cary, Somerset.
HURLE, J. COOKE. Brislington Hill, Brislington, Somerset.

JEFFREY, ROBERT. The Throsk, Succoth Place, Murrayfield.
JONES, JOSEPH. Coton House, Wolverhampton.

KEEL, WALTER W. Stanton Drew, Bristol.
KELLY, A. L. (Major). Cadbury House, North Cadbury, Somerset.

MARSHALL, L. H. Chippenham, Wilts.
MATTHEWS, HENRY. Winterbourne, Bristol.
MID-SOMERSET AGRICULTURAL SOCIETY. Shepton Mallet.
MOLE, H. B. Royal Albert Brewery, Queen's Road, Reading.
MONMOUTHSHIRE CHAMBER OF AGRICULTURE. Newport.
MORRIS, Mrs. LIZZIE. 147, Harley Street, London.

NAPIER, H. B. Estate Office, Long Ashton, Bristol.
NORTH SOMERSET AGRICULTURAL SOCIETY (F. W. HUNT). 26, Nicholas Street, Bristol.

OSBORN, C. Woolston, North Cadbury, Somerset.
OSBOURNE, J. S. SMYTH-. Ash, Iddesleigh, N. Devon.

PORTER, W. J. H. Glendale Farm, Wedmore, Somerset.
POWER, THOMAS. Dungarvan, Waterford, Ireland.
PRICE, M. PHILIP. Tibberton Court, Gloucestershire.
RADSTOCK AND DISTRICT SMALL HOLDINGS SOCIETY, LTD. (Secretary, A. P. Grenfell, Wynbee Hall, 28, Commercial Street, Radstock, Somerset).
RANKIN, Sir James, Bart., M.P. Bryngwyn, Hereford.
RILEY, JOHN. Putley Court, Ledbury.

Members *(continued).*

ROOTES, CHARLES, c/o Messrs. Pulling & Co., Bath Street, Hereford.
ROYAL JERSEY AGRICULTURAL SOCIETY. Jersey.
RUCK, G. A. The Copse, Shiplett, Weston-super-Mare.
RUSSELL, S. G. Dumper's Farm, Chew Magna, Somerset.

SHELLEY, Sir JOHN, Bart. Shobrooke Park, Crediton, Devon.
SHERSTON, C. D. (Major). Evercreech, Bath.
SILLIFANT, A. O. Culm Leigh, Stoke Canon, Exeter.
SLATTER, JAMES. Paxford, Campden, Gloucester.
SMITH, J. W. Thinghill Court, Hereford.
SOMERSET COUNTY AGRICULTURAL ASSOCIATION. Taunton.
SOMERVILLE, A. F. Dinder, Wells, Somerset.
STEWART, J. FINLAY. Aish Cross House, near Totnes, Devon.
STIRLING, JAMES L. 18, Eustace Street, Dublin.
STOOKE, J. E. HELLYAR. 2, Palace Yard, Hereford.
STRACHEY, Sir EDWARD, Bart., M.P. Sutton Court, Pensford, Bristol.
SUTTON, LEONARD G. Hillside, Reading.
SYMONS, JOHN & Co., Ltd. Totnes, Devon.

TAUNTON DEANE HORTICULTURAL AND FLORICULTURAL SOCIETY. Taunton Deane, Somerset.
THOMAS, AUBREY (Lieut.-Col.). Overross, Hereford.
TILLEY, L. H. Banham, near Attleborough, Norfolk.
TILLEY, W. T. S. East Compton, Shepton Mallet.
TREDEGAR, The RIGHT HON. VISCOUNT, Tredegar Park, Newport.

VANDELEUR, THOS. P. Par Station, Cornwall.
VINE PRODUCTS Co., LTD. V. P. Winery, Oil Mill Lane, Kingston-on-Thames.

WALKER, E G. F. The Hollies, Chewstoke, Bristol.
WALKEY, C. E. J. Edgeborough, Staplegrove, Taunton.
WALLIS, W. Tewkesbury, Gloucester.
WARDLAW, H. Holway Farm, Sherborne, Dorset.
WARREN, RICHARD, A. Belle Vue, Harrow Road, Worcester.
WATTS, JAMES. Backwell, near Bristol.
WHEELER, E. VINCENT V. Newnham Court, Tenbury, Worcestershire.
WHISH, E. BARCLAY. The Cottage, East Cranmore, Shepton Mallet.
WHITEWAY, HENRY. Fordron House, Whimple, Devon.
WILLIAMS, T. W. Bank Chambers, Corn Street, Bristol.
WILSON & Co., LTD. Frome, Somerset.
WOLLASTON G. H. Flax Bourton, Bristol.
WOOTTON, JOHN H. Byford, Hereford.

Associates:

ALLEN, J. D. Springfield, Shepton Mallet.
ALLISON, J. B. Rock Villa, Burrowbridge, Bridgwater.

BATIEN, GEORGE. Rosebank, Pensford, Bristol.
BELL, F. A. Wellow House, Wellow, Newark.
BIRD, WILLIAM. The Nest, Overndale Road, Fishponds, Bristol.
BLINMAN, H. T. Farrington Gurney, Somerset.
BRITTEN, J. E. Old Wood, Tenbury, Worcester.
BROOK, CHARLES. Marksbury, Somerset

CARTER, FREDERICK J. Failand Farm, Failand, Bristol.
CAZALET, R. H. The Bannut Tree House, Castlemorton, Malvern, Worcester.
CHAPMAN, WALTER. Hewish, Bristol.
CHOLMELEY, H. C. FAIRFAX. Brandsby, Easingwold, York.
COCKS, A. H. Poynetts, Skirmett, near Henley-on-Thames, Oxon.
CROFTS, JOHN. Sutton Montis, Sparkford, Somerset.

De Goosh, Arthur W. Kimball Buildings, 18, Tremont Street, Boston, U.S.A.
Eley, John P. Mays Hill, Frampton Cotterell, near Bristol.
Fowles, L. E. Wallwyn Court, Much Marcle, Hereford.
Giles, John. Portbury, Bristol.
Gripper, H. P. Myrtle House, Bradpole, Bridport, Dorset.
Howland, A. T. Sunnybrook Fruit and Bee Farm, Beckford, near Tewkesbury.
Hunt, Walter. Easton-in-Gordano, Somerset.
Jones, George. Wood Farm, Welland, Malvern.
Langford, E. W. Wyebridge Stores, Hereford
McCreath, W. D. Quantock Vale Cider Works, North Petherton, Bridgwater.
Pope, John M. Spence Combe, Copplestone, Devon.
Powell, J. J. S. Hall Court, Much Marcle, Hereford.
Pretty, W. H. 4, The Terrace, Shirehampton, Bristol.
Reid, Hugh. Long Ashton, Bristol.
Ridler, R. E. Clehonger Manor, Hereford.
Ripley, E. G. Beaston House, Bucknall, Shropshire.
Stone, Thos. Wine and Cider Merchant, Axminster.
Symes, J. H. Coat Farm, Martock, Somerset.
Sutton, William Lincolne. Eaton, Norwich.
Tavener, George E. Budlake, Broadclyst, Devon.
Thompson, Ernest H. Gilmorton, Tenbury, Worcester.
Tuckett, Philip D. Netherton, near Newton Abbott.
Tudway, C. C. Wells, Somerset.
Turner, Wm. Heath Barton, Pinhoe, Exeter.
Waller, J. A. Pen Park, Westbury-on-Trym, Bristol.
Warren, Cyprian A. 8, Lichfield Gardens, Richmond, Surrey.
Wells, Edgar H. Ford, Wellington, Somerset.
Weston, Henry. Bounds Farm, Much Marcle, Hereford.
Woodgate, G. A. Gattertop, Leominster.
Yelland, W. D. Nethercot, Iddesleigh, Devon.

Life Member :

Hunt, A. E. Brooke-. Board of Agriculture and Fisheries, 8, Whitehall Place, London, S.W.

Hon. Members.

Secretary, Devon Agricultural Education Committee.
,, Gloucester ,, ,, ,,
,, Hereford ,, ,, ,,
,, Somerset ,, ,, ,,
,, Worcester ,, ,, ,,
Lloyd, F. J. Muscovy House, Trinity Square, London, E.C.

Resident Director :

B. T. P. Barker, M.A. The National Fruit and Cider Institute, Long Ashton, Bristol.

Superintendent of Fruit Department :

J. Ettle, F.R.H.S. Stanley Grove Road, Weston-super-Mare.

Hon. Treasurer :

H. B. Napier. Estate Office, Long Ashton, Bristol.

Hon. Secretary :

W. J. Grant. County Council Offices, Pentonville, Newport, Mon.

REPORT BY THE GOVERNORS.

1. The Governors beg to submit to the Members the following Report on the work of the Institute during the past year.

2. The Institute has been founded and is maintained by the following Bodies :—

The Board of Agriculture and Fisheries.
The Bath and West and Southern Counties Society.
Devon County Council.
Gloucester County Council.
Hereford County Council.
Monmouth County Council.
Somerset County Council.
Worcester County Council.

Members Associates

3. Since the formation of the Institute, new Members and Associates have been enrolled each year, and the Governors hope that as the work and objects of the Institute become more widely known there will be a steady increase in the number of both Members and Associates.

4. In accordance with Article 30 of the Articles of Association, the following Governors retire :—

Governors.	By whom appointed.
Brooke-Hunt, Mr. A. E. ..	Broad of Agriculture.
Dyson, Mr. Gibson	Governors.
Hobhouse, The Rt. Hon. ..	Somerset County Council.
Lloyd-Baker, Mr. G. E.	Gloucester County Council.
Napier, Mr. H. B.	Bath and West Society.
Radcliffe-Cooke, Mr. C. W. ..	Hereford County Council.
Wheeler, Mr. E. Vincent V. ..	Worcester County Council.
Wootton, Mr. John H.	Members and Associates.

These Governors are eligible for re-nomination by the various bodies whom they represent.

Advantage Institute.

5. The Governors and Managing Committee wish to impress upon the Counties concerned, and upon all persons interested in the important industry of Cider-making the advantages of the opportunity now placed at their disposal,

through the formation of the Institute, by means of which they may obtain advice and assistance bearing upon this industry, either by personally visiting the Institute, or by sending their sons there to receive instruction, scientific and practical, not only in Cider and Perry-making, but also in the growth of fruit and the production of fruit trees.

erms.

6. Students can be received on the following terms :—

Scientific instruction in the Laboratory :—

Four guineas for one month's instruction ; or

Ten guineas for three months' instruction.

Working pupils from subscribing Counties can be received at the Institute for a period of not less than one year for instruction upon Fruit-growing, and to work upon the Farm. Pupils to receive a wage of 7s. 6d. per week from the Institute, the Counties sending the pupils to contribute a Scholarship of £20 per annum.

istribution Cider Apple nd Perry ear Trees.

7. 416 trees have again been distributed during this season (1910) for the purpose of establishing, what might be termed, the best examples of Cider and Perry Orchards to the following :—

Devon County Council	.. ..
Gloucester County Council	.. ..
Hereford County Council	.. ..
Monmouth County Council	.. ..
Somerset County Council	.. ..
Worcester County Council	
Board of Agriculture	.. ..
Bath and West Society	.. ..
Members	.. ..

ractical ork.

8. In October and November, 1910, the Cider-making months, a large number of those interested in the West country industry of Cider-making availed themselves of the opportunity of visiting the Institute.

nspection of stitute, ruit ursery and lantation.

9. Since the last Report the Institute has been inspected by those who are interested both in the Cider industry and Fruit Culture from many counties, all of whom seemed to be thoroughly impressed with the very practical and thorough manner in which the making of Cider was carried out, and also in the production of the best Cider Apples and Perry

Pears, which are being grown in the Nursery attached to the Institute.

10. With a view of extending the usefulness of the Institute arrangements were made by which exhibits from an educational standpoint were sent to— Object Lesso

Bath and West and Southern Counties Society's Show, Rochester.
Royal Agricultural Society's Show, Liverpool.
Brewers' Exhibition, London.
Buenos Ayres Exhibition.
Hereford and Worcester Agricultural Society's Show.
Mid-Somerset Agricultural Society's Show.
Somerset County Agricultural Society's Show.
Royal Horticultural Society's Show.
Gloucester Agricultural Society's Show.
Monmouth County Council Exhibition.
Devon County Agricultural Society's Show.
Taunton Deane Horticultural Society's Show.

11. A thoroughly representative, and certainly one of the largest, gatherings that has yet taken place at the Institute, met on Thursday, 27th April, 1911, for the purpose of inspecting the Fruit plantations, seeing the work that was being done, and tasting the Cider and Perry made from Fruit grown in the various Cider counties. Annual Tasting Day

Mr. Barker, as on previous occasions after the tasting, gave to an interested audience an object lesson of considerable value on the various yeasts that are desirable or otherwise in the successful fermentation of Cider or Perry ; in this way the Visitors had an excellent opportunity of forming some ideas as to the value and necessity of the research work that was being carried out at the Institute.

12. The Governors take this opportunity of requesting all who are either interested in the Institute or in the work it is doing, to use their influence in urging others to become Members. Members' subscriptions are one guinea per annum, for which they receive all the literature published by the Institute, and can have either six varieties of Apples or Pears or six kinds of Cider or Perry analysed each year. They are also able to purchase Cider and Perry Trees raised at the Institute to the number of 100 per annum at the rate of 2s.

per tree (to Non-members the price is 2s. 6d. per tree) as far as the supply permits. Grafts and buds of apples and pears are also available. Associates' subscriptions are 5s. per annum. They have the same privileges, with the exception that they are unable to vote at the Annual Meeting; while both Members and Associates can visit the Institute and obtain advice from Mr. B. T. P. Barker, upon all matters in connection with the Cider industry.

13. In the Appendix will be found a Report upon the work of the Institute during 1910 from Messrs. B. T. P. Barker and J. Ettle.

W. J. GRANT,
Hon. Sec.

THE NATIONAL FRUIT AND CIDER INSTITUTE.

CASH ACCOUNT FOR THE YEAR 1910.

	£ s. d.	£ s. d.
To GRANTS—		
Board of Agriculture	300 0 0	
Bath and West of England Society	100 0 0	
Devon County Council	100 0 0	
Gloucester County Council	100 0 0	
Hereford County Council	100 0 0	
Somerset County Council	100 0 0	
Worcester County Council	100 0 0	
Monmouth County Council	50 0 0	
		950 0 0
To AFFILIATION FEES.		
Berkeley Hunt Agricultural Society	1 1 0	
Brewers' Exhibition	1 1 0	
Bristol University	1 1 0	
Bristol and District Market Gardeners' Association	1 1 0	
Mid-Somerset Agricultural Society	1 1 0	
Monmouth Chamber of Agriculture	1 1 0	
North Somerset Agricultural Society	1 1 0	
Royal Jersey Agricultural Society	1 1 0	
Somerset County Agricultural Society	1 1 0	
Taunton Deane Horticultural Society	1 1 0	
		10 10 0
To MEMBERS' SUBSCRIPTIONS		79 16 0
To ASSOCIATES' SUBSCRIPTIONS		9 0 0
To MISCELLANEOUS RECEIPTS—		
Harding R., Grazing Rent	11 12 6	
Hart, A. H., Pupil's Fee	10 10 0	
		22 2 6
To SALES		266 4 10
Balance due to Bank		19 15 7
		£1,357 8 11

We hereby certify that the above is a true extract from the Cash Book of the National Fruit and Cider Institute.

(Signed) CURTIS, JENKINS & CO.,
Chartered Accountants.

Bristol: 28th April, 1911

	£ s. d.	£ s. d.
By Balance due to Bankers		128 8 0
By SCIENTIFIC STAFF AND EXPENSES—		
Barker B. T. P., Salary	312 10 0	
Sundry Bills and Expenses	16 15 3	
		329 5 3
By RENTS, RATES, etc.—		
Ashton Court Estate, Rent	80 0 0	
Insurance, and Interest	5 11 10	
Rates and Taxes	16 2 5	
Repayment of Loan	79 0 2	
		180 14 5
By Buildings Account } Additions to Capital	15 8 6	
Machinery, Plant, etc. } Additions to Capital	14 10 11	
Laboratory Fittings } Additions to Capital	2 4 9	
		32 4 2
By MANAGEMENT ACCOUNT—		
Accountant, Correspondents and Auditors	36 14 0	
Secretarial, Postages and Expenses	13 12 10	
Treasurer's Postages	4 1 3	
Printing, Stationery, etc.	48 13 9	
		103 1 10
By ORCHARDS NURSERY & PLANTATION ACCOUNT—		
Labour	209 8 2	
Trees, Manure, etc.	84 2 8	
Superintendent's Honorarium and Expenses	51 16 0	
		345 6 10
By CIDER MAKING ACCOUNT—		
Labour	75 13 0	
Apples, Carriage, etc.	111 19 11	
		187 12 11
By MISCELLANEOUS ACCOUNT—		
Show Expenses, Advertising, etc.		50 15 6
		£1,357 8 11

Balance Sheet, 31st December, 1910.

Liabilities.	£	s.	d.	*Assets.*	£	s.	d.	£	s.	d.
LLOYDS BANK—Overdraft	19	15	7	PROPERTY ACCOUNT—						
Balance	802	17	9	Buildings	20	0	0			
				Machinery, Plant, etc.	117	10	0			
				Laboratory fittings	35	5	8			
								172	15	8
				STOCKS—						
				Nursery	505	18	3			
				Cider	118	6	4			
								624	4	7
				Sundry Debtors, as per Ledger				25	13	1
	£822	13	4					£822	13	4

(Signed) C. W. RADCLIFFE COOKE, JAMES WATTS, } Governors.

Note.—On entering into a New Lease the Buildings, Machinery, etc., were valued by Messrs. Geo. Nichols, Young, Hunt & Co., at the figures shown above.

Auditors' Report.—We report that we have audited the Books and Accounts of the Institute for the year ended 31st December, 1910, together with the Balance Sheet made up as on that day and above set forth. All the information and explanations required have been furnished us. In our opinion the Balance Sheet above referred to is properly drawn up so as to exhibit a true and correct view of the state of the Institute's affairs according to the best of the information and explanations supplied to us, and as shown by the books of the Institute.

(Signed) CURTIS, JENKINS & CO.,
Chartered Accountants.

Bristol; 28th April, 1911.

APPENDIX.

REPORT BY B. T. P. BARKER, M.A., *Director*,

AND

J. ETTLE, F.R.H.S., *Superintendent of Fruit Department*..

In view of the recent publication of the Report summarising the work of the Institute from its establishment in the autumn of 1903 until the completion of the original lease in September, 1910, it has been decided to curtail somewhat the present Report dealing with the work of the latter year, restricting it mainly to matters with which there may not be a convenient opportunity to deal later, and deferring to a subsequent occasion those which can suitably be delayed on account of the more or less incomplete state of the work relating to them. Owing to the disappointing character of the 1910 fruit crop and the irregular results therefore obtained in some of the investigations relating to fruit culture this branch of the work particularly will not require so much attention as usual, and the consideration of some of the subjects may well be postponed.

THE EXPERIMENTAL CIDER WORK.

Single Variety Trials.

The cider-making on a practical scale was mainly concerned with the investigation of the qualities of individual varieties owing to the difficulty of obtaining a sufficient supply of suitable fruit to carry on more elaborate experiments. While it is to be regretted that several important lines of work on that account had to be suspended for a year, the results for the season proved particularly interesting. In the first place, the summer of 1909 was so abnormal in character, lacking sunshine and being excessive in rainfall, that its effect upon the vintage of that season was very marked. Secondly, several varieties not previously tested were procured for trial and some proved to be of special promise, taking into consideration the nature of the season. Details of the individual ciders follow; but a few general remarks dealing with the influence of the season may first be made.

The quality of the fresh juices in nearly every case was considerably below the average. The specific gravity was, as a rule, several points lower than the normal for the varieties concerned, and the amount of sugar was thus seriously reduced. The acidity, on the other hand, was decidedly higher than usual, especially in the bitter-sweet varieties. The percentage of tannin generally was appreciably below the average amount, except in the sweet varieties. The rate of fermentation was almost invariably unusually rapid. The ciders themselves showed corresponding features. There was a general lack of richness and body; and although in most instances a fair average gravity was retained by means of repeated filtration, the liquor was wanting in the true fruity aroma and flavour and in body, and depended mainly upon its sweetness for its character. It was difficult to prepare satisfactory blends, since the acidity of the malic acid and the bitter astringency of the tannin stood out in striking fashion, and could not be masked sufficiently by the other elements of flavour. The manner in which the tannin flavour predominated was very marked. Other features deserving of mention were the poor keeping quality of the fruit and the rapidity with which it matured. Kingston Black apples, for example, were at the fittest state for milling towards the end of October, whereas in a normal year they do not approach that stage until the end of November or the first half of December.

CIDERS.

SHARP VARIETIES—(including those containing normally at least ·45 per cent. Malic Acid).

Butterbox (Devon).—Analysis of fresh juice, November 24th, 1909: specific gravity 1·045, malic acid ·53 per cent., tannin ·140 per cent. Weight of fruit, 1,103lbs; yield of juice, 920lbs. Average daily fall in specific gravity at 28°C., ·0038. Filtered December 27th, 1909: specific gravity, 1·028. Specific gravity in bottle, May 5th, 1910: 1·021. A pleasant, medium brisk cider of fair flavour and aroma; thin and lacking in body. Useful for blending with a heavier type, but hardly of sufficient character for use alone.

College (Hereford).—Analysis of fresh juice, November 24th, 1909: specific gravity 1·049, malic acid ·63 per cent., tannin ·156 per cent. Weight of fruit, 1,280lbs; yield of juice, 1,072lbs. Average daily fall in specific gravity at 28°C., ·0034. Filtered January 3rd, 1910: specific gravity, 1·030. Specific gravity in bottle, May 5th, 1910: 1·025. A rather brisk, medium sweet cider of useful quality: flavour and aroma fair, body deficient. Useful for blending with a heavier bitter sweet, but too brisk and thin for use alone.

Dymock Red (Hereford).—Analysis of fresh juice, November 10th, 1909: specific gravity 1·056, malic acid ·48 per cent., tannin ·252 per cent. Weight of fruit, 1,350lbs; yield of juice, 1,079lbs. Average daily fall in specific gravity at 28°C., ·0034. Filtered December 20th, 1909: specific gravity, 1·037. Specific gravity in bottle, May 5th 1910: 1·030. A rich, sweet, full-bodied cider; flavour slightly brisk with decided astringency, and very pleasant,

aroma well marked and fruity. Considering the season, an excellent cider for use alone, although the tannin was rather more prominent than desirable.

Foxwhelp (Hereford).—Analysis of fresh juice, November 3rd, 1909: specific gravity 1·048, malic acid 1·30 per cent., tannin ·308 per cent. Weight of fruit, 990lbs; yield of juice, 726lbs. Average daily fall in specific gravity at 28°C., ·0015. Filtered January 3rd, 1910: specific gravity 1·035. Specific gravity in bottle, May 5th, 1910: 1·034. A cider of very pronounced character: extremely sharp and characteristic in flavour, otherwise pleasant and with a nice aroma. Very slow in maturing, and requires time to develope; in its first season much too sharp for use alone. During the spring and early summer of 1910, although perfectly brilliant immediately after filtration, it gradually became turbid; and the turbidity was only temporarily removed by re-filtration. In bottle the substance responsible for the turbidity was slowly deposited as a thick, firm crust on the sides of the bottle, and the liquor eventually, towards the autumn, became perfectly brilliant again.

Frederick (Monmouth).—A. Pomace pressed immediately after milling.—Analysis of fresh juice, November 29th, 1909: specific gravity 1·053, malic acid ·83 per cent., tannin ·076 per cent. Average daily fall in specific gravity at 28°C., ·0025. Filtered January 10th, 1910: specific gravity 1·036. Specific gravity in bottle May 5th, 1910: 1·030. A very brisk cider of very fair flavour and aroma and with good body. A useful sharp cider for blending, but of little value alone.

Ditto.—B. Pomace allowed to stand for one week after milling before being pressed. —Analysis of freshly pressed juice, December 8th, 1909: specific gravity 1·051, malic acid ·65 per cent., tannin ·078 per cent. Average daily fall in specific gravity at 28°C., ·0032. Filtered January 3rd, 1910: specific gravity 1·033. Specific gravity in bottle, May 5th, 1910: 1·029. A cider of similar type to the preceding, but presenting some differences in flavour. In the early summer of 1910 it was slightly more fruity and softer in character, but as the season advanced the flavour deteriorated and was not so clean to the palate as the preceding.

Kingston Black (Burrowbridge, Somerset).—Analysis of fresh juice, November 16th, 1909: specific gravity 1·047, malic acid ·45 per cent., tannin ·118 per cent. Weight of fruit, 845lbs; yield of juice 671lbs. Average daily fall in specific gravity at 28°C., ·0040. Filtered December 13th, 1909: specific gravity 1·034. Specific gravity in bottle, May 5th, 1910: 1·028. A medium brisk, rather sweet cider of moderate flavour and aroma; much below the average standard of this variety.

Kingston Black (Chedzoy, Somerset).—Analysis of fresh juice, December 8th, 1909: specific gravity 1·057, malic acid ·51 per cent., tannin ·160 per cent. Weight of fruit, 2,168lbs; yield of juice, 1,636lbs. Average daily fall in specific gravity at 28°C., ·0110. Filtered January 3rd, 1910: specific gravity 1·032. Specific gravity in bottle, May 5th, 1910: 1·025. A medium sweet, moderately brisk cider; rather coarse in flavour, and aroma inferior. This sample undoubtedly suffered from the fruit being much over-ripe at the time of milling.

Kingston Black (Hereford).—Analysis of fresh juice, November 16th, 1909: specific gravity 1·057, malic acid ·54 per cent., tannin ·146 per cent. Weight of fruit, 560lbs; yield of juice, 433lbs. Average daily fall in specific gravity at 28°C., ·0031. Filtered December 27th, 1909: specific gravity 1·035. Specific gravity in bottle, May 5th, 1910: 1·029. A sweet, rather brisk cider; flavour and aroma fairly good, but body deficient. Fair for use alone, but improved by blending with a heavier type.

Lady's Finger (Somerset).—Analysis of fresh juice, November 16th, 1909: specific gravity 1·050, malic acid ·58 per cent., tannin ·110 per cent. Weight of

fruit, 416lbs; yield of juice, 321lbs. Average daily fall in specific gravity at 28°C., ·0072. Filtered December 13th, 1909: specific gravity 1·021. Specific gravity in bottle, May 5th, 1910: 1·019. A light, medium brisk cider, with the characteristic flavour and aroma invariably found with this variety; lacking in body. Can be used alone or blended.

Parsons (Somerset).—Analysis of fresh juice, December 8th, 1909: specific gravity 1·048, malic acid ·51 per cent., tannin ·100 per cent. Weight of fruit, 1,125lbs; yield of juice, 896lbs. Average daily fall in specific gravity at 28°C., ·0057. Filtered January 3rd, 1910: specific gravity 1·032. Specific gravity in bottle, May 5th, 1910: 1·021. A medium brisk cider of fair flavour and aroma, lacking in body and distinction. Too thin alone, but moderately useful for blending.

Porter's Perfection (Somerset).—Analysis of fresh juice, December 22nd, 1909: specific gravity 1·044, malic acid ·51 per cent., tannin ·144 per cent. Weight of fruit, 1,046lbs; yield of juice 807lbs. Average daily fall in specific gravity at 28°C., ·0025. Filtered January 10th, 1910: specific gravity 1·035. Specific gravity in bottle, May 5th, 1910: 1·027. A rather sweet, medium brisk cider; flavour pleasant, but thin and lacking in body, and aroma good. A variety very useful unblended in a normal season, but in this case improved by blending with a heavier type.

Saracen (Somerset).—Analysis of fresh juice, December 8th, 1909: specific gravity 1·052, malic acid ·78 per cent., tannin ·136 per cent. Weight of fruit, 1,165lbs; yield of juice, 957lbs. Average daily fall in specific gravity at 28°C., ·0058. Filtered January 3rd, 1910: specific gravity 1·032. Specific gravity in bottle, May 5th, 1910: 1·024. A sharp cider of medium sweetness; aroma and flavour fair, body rather deficient. A fairly useful sharp cider for blending, but unsuited for use alone.

Wilding Neverblight (Somerset).—Analysis of fresh juice, December 8th, 1909: specific gravity 1·043, malic acid ·75 per cent., tannin ·092 per cent. Weight of fruit, 1,066lbs; yield of juice, 830lbs. Average daily fall in specific gravity at 28°C., ·0050. Filtered December 27th, 1909: specific gravity 1·035. Specific gravity in bottle, May 5th, 1910: 1·027. A sharp, light cider of useful quality; aroma and flavour very fair. A useful cider for blending, although weak in character.

SWEET VARIETIES—(including those containing normally less than ·45 per cent. Malic Acid and ·2 per cent. Tannin).

Farmer's Friend (Somerset).—Analysis of fresh juice, November 16th, 1909: specific gravity 1·056, malic acid ·22 per cent., tannin ·180 per cent. Weight of fruit, 1,200lbs; yield of juice 853lbs. Average daily fall in specific gravity at 28°C., ·0030. Filtered January 3rd, 1910: specific gravity 1·032. Specific gravity in bottle, May 5th, 1910: 1·023. A pleasant, medium sweet cider of fair body, with nice aroma and flavour. Useful, although somewhat insipid alone, and valuable for blending.

Norton Bitter (Somerset).—Analysis of fresh juice, December 17th, 1909: specific gravity 1·047, malic acid ·22 per cent., tannin ·188 per cent. Weight of fruit, 1,218lbs; yield of juice, 849lbs. Average daily fall in specific gravity at 28°C., ·0037. Filtered January 17th, 1910: specific gravity 1·032. Specific gravity in bottle, May 5th, 1910: 1·030. A fairly rich, sweet cider of good and well marked flavour and aroma. Good alone and excellent for blending.

Nursery Jersey (Somerset).—Analysis of fresh juice, December 17th, 1909: specific gravity 1·044, malic acid ·31 per cent., tannin ·180 per cent. Weight of fruit, 994lbs; yield of juice, 809lbs. Average daily fall in specific gravity at 28°C., ·0028. Filtered January 17th, 1910: specific gravity 1·033.

Specific gravity in bottle, May 5th, 1910: 1·030. A cider of very similar character to the preceding. A promising variety, in spite of the low original gravity.

Slack-ma-girdle (Devon).—Analysis of fresh juice, November 24th, 1909: specific gravity 1·050, malic acid ·19 per cent., tannin ·108 per cent. Weight of fruit, 1,064lbs; yield of juice, 8·2lbs. Average daily fall in specific gravity at 28°C., ·0074. Filtered December 20th, 1910: specific gravity 1·030. Specific gravity in bottle, May 5th, 1910: 1·024. A light, rather insipid, medium sweet cider; flavour and aroma very fair, but body deficient. A useful cider for blending, but with hardly sufficient character for use alone.

Sweet Alford (Devon).—Analysis of fresh juice, November 29th, 1909: specific gravity 1·050, malic acid, ·19 per cent., tannin ·134 per cent. Weight of fruit, 2,416lbs; yield of juice, 1,971lbs. Average daily fall in specific gravity at 28°C., ·0031. Filtered January 10th, 1910: specific gravity 1·027. Specific gravity in bottle, May 5th, 1910: 1·021. A medium sweet cider of a somewhat light and insipid type; flavour and aroma very fair. Very useful for blending, but of insufficient character for use alone.

Taylor's Bitter (Somerset).—Analysis of fresh juice, November 10th, 1909: specific gravity 1·048, malic acid ·16 per cent., tannin ·136 per cent. Weight of fruit, 2,730lbs; yield of juice, 2,403lbs. Average daily fall in specific gravity at 28°C., ·0070. Filtered December 6th, 1909: specific gravity 1·026. Specific gravity in bottle, May 5th, 1910: 1·018. A light, medium cider; flavour and aroma fair, but rather coarse. Lacking in character and quality for use alone, but fairly useful for blending.

Woodbine (Devon).—Analysis of fresh juice, November 29th, 1909: specific gravity 1·045, malic acid ·14 per cent., tannin ·132 per cent. Weight of fruit, 1,595lbs; yield of juice, 1,314lbs. Average daily fall in specific gravity at 28°C., ·0054. Filtered December 27th, 1909: specific gravity 1·030. Specific gravity in bottle, May 5th, 1910: 1·017. A rather coarse, medium cider of moderate flavour and aroma, deficient in body. Inferior for use alone, but moderately useful for blending.

BITTERSWEET VARIETIES.—(including those containing normally less than ·45 per cent. Malic Acid and more than ·2 per cent. Tannin).

Brown Snout (Hereford).—Analysis of fresh juice, November 24th, 1909: specific gravity 1·047, malic acid ·22 per cent., tannin ·156 per cent. Weight of fruit, 1,080lbs; yield of juice 859lbs. Average daily fall in specific gravity at 28°C., ·0040. Filtered December 20th, 1909: specific gravity 1·030. Specific gravity in bottle, May 5th, 1910: 1·025. A useful light bittersweet cider; flavour and aroma very fair. Pleasant alone, but better blended with a brisker cider.

Chisel Jersey (East Lambrook, Somerset).—Analysis of fresh juice, December 8th, 1909: specific gravity 1·054, malic acid ·27 per cent., tannin ·298 per cent. Weight of fruit, 1,143lbs; yield of juice, 840lbs. Average daily fall in specific gravity at 28°C., ·0066. Filtered January 3rd, 1910; specific gravity 1·032. Specific gravity in bottle, May 5th, 1910: 1·022. A fairly full bodied, medium sweet cider; flavour and aroma fair. A useful cider for blending, but rather too astringent alone.

Chisel Jersey (Martock, Somerset).—Analysis of fresh juice, November 29th, 1909: specific gravity 1·055, malic acid ·19 per cent., tannin ·288 per cent. Weight of fruit, 1,150lbs; yield of juice, 884lbs. Average daily fall in specific gravity at 28°C., ·0052. Filtered December 31st, 1909: specific gravity, 1·034. Specific gravity in bottle, May 5th, 1910: 1·025. A cider of similar type to the preceding, but of rather better quality.

Counsellor (Gloucester).—Analysis of fresh juice, November 16th, 1909: specific gravity 1·043, malic acid ·24 per cent., tannin ·216 per cent. Weight of

fruit, 1·131lbs ; yield of juice, 919lbs. Average daily fall in specific gravity at 28°C., ·0060. Filtered December 13th, 1909 : specific gravity, 1·027. Specific gravity in bottle, May 5th, 1910 : 1·008. A coarse, rough, dry cider ; flavour poor and aroma unpleasant. Unsuited for use alone and inferior for blending.

Dabinett (Somerset).—Analysis of fresh juice, December 8th, 1909 : specific gravity 1·050, malic acid ·31 per cent., tannin ·160 per cent. Weight of fruit, 1,180lbs ; yield of juice, 910lbs. Average daily fall in specific gravity at 28°C., ·0048. Filtered January 10th, 1910 : specific gravity 1·030. Specific gravity in bottle, May 5th, 1910 : 1·024. A medium sweet, very mildly bitter cider ; aroma and flavour very fair. Moderately good alone, but better blended with a cider of brisker type.

Early Red Jersey (Somerset).—Analysis of fresh juice, October 7th, 1909 : specific gravity 1·045, malic acid ·22 per cent., tannin ·414 per cent. Weight of fruit, 1,594lbs ; yield of juice, 1,254lbs. Average daily fall in specific gravity at 28°C., ·0055. Filtered November 1st, 1909 : specific gravity 1·015. Specific gravity in bottle, May 5th, 1910 : 1·012. A medium dry, bitter cider ; coarse in flavour, and of unattractive aroma. Moderate for blending, and too bitter alone.

Green Windsor (Somerset).—Analysis of fresh juice, December 17th, 1909 : specific gravity 1·054, malic acid ·27 per cent., tannin ·272 per cent. Weight of fruit, 1,166lbs ; yield of juice, 880lbs. Average daily fall in specific gravity at 28°C., ·0031. Filtered January 17th, 1910 : specific gravity 1·036. Specific gravity in bottle, May 5th, 1910 : 1·029. A fairly rich, full-bodied sweet cider of good aroma and flavour. Good alone, although somewhat bitter, and very useful for blending.

Red Jersey (Somerset).—Analysis of fresh juice, November 16th, 1909 : specific gravity 1·055, malic acid ·21 per cent., tannin ·338 per cent. Weight of fruit, 2·153lbs ; yield of juice, 1,655lbs. Average daily fall in specific gravity at 28°C., ·0058. Filtered December 13th, 1909 : specific gravity 1·034. Specific gravity in bottle, May 5th, 1910 : 1·025. A rather sweet cider with a very astringent bitter flavour ; aroma fair. Too bitter for use alone, but fair for blending.

Royal Wilding (Hereford).—Analysis of fresh juice, December 8th, 1909 : specific gravity 1·062, malic acid ·38 per cent., tannin ·323 per cent. Weight of fruit, 984lbs ; yield of juice, 736lbs. Average daily fall in specific gravity at 28°C., ·0060. Filtered January 10th, 1910 : specific gravity 1·032. Specific gravity in bottle, May 5th, 1910 : 1·030. A rich bitter cider of full pleasant flavour and aroma. Too bitter for use alone, but valuable for blending.

Russet Jersey (Somerset).—Analysis of fresh juice, November 16th, 1909 : specific gravity 1·057, malic acid ·24 per cent., tannin ·280 per cent. Weight of fruit, 530lbs ; yield of juice, 451lbs. Average daily fall in specific gravity at 28°C., ·0065. Filtered December 13th, 1910 : specific gravity 1·030. Specific gravity in bottle, May 5th, 1910 : 1·019. A rather thin, medium bitter-sweet cider ; flavour and aroma moderate. Fairly useful for blending, but unsuited for use alone.

Spreading Norman (Hereford).—Analysis of fresh juice, December 8th, 1909 : specific gravity 1·056, malic acid ·30 per cent., tannin ·356 per cent. Weight of fruit, 1,035lbs ; yield of juice, 752lbs. Average daily fall in specific gravity at 28°C., ·0073. Filtered January 3rd, 1910 : specific gravity 1·033. Specific gravity in bottle, May 5th, 1910 : 1·023. A rather coarse, medium sweet cider with well-marked bitter flavour ; aroma fair. Too bitter alone, but fairly useful for blending.

Twistbody Jersey (Somerset).—Analysis of fresh juice, November 29th, 1909 : specific gravity 1·058, malic acid ·22 per cent., tannin ·352 per cent. Weight of fruit, 1,223lbs ; yield of juice, 976lbs. Average daily fall in specific

gravity at 28°C., ·0030. Filtered January 17th, 1910: specific gravity 1·033. Specific gravity in bottle, May 5th, 1910: 1·030. A rich, fruity, sweet cider, with decided astringent character; flavour very good and aroma pleasant. Rather too bitter for use alone, but excellent for blending.

White Close Pippin (Somerset).—Analysis of fresh juice, November 24th, 1909: specific gravity 1·048, malic acid ·18 per cent., tannin ·244 per cent. Weight of fruit, 1,080lbs; yield of juice, 845lbs. Average daily fall in specific gravity at 28°C., ·0031. Filtered December 27th, 1909: specific gravity 1·032. Specific gravity in bottle, May 5th, 1910: 1·029. A rather rich, fruity, sweet cider with mild bitter flavour: aroma and flavour excellent. Very good alone, but improved by blending with a brisker type.

PERRY.

Oldfield (Hereford).—Analysis of fresh juice, November 16th, 1909: specific gravity 1·057, malic acid ·61 per cent., tannin ·272 per cent. Weight of fruit, 1,440lbs; yield of juice, 1,093lbs. Average daily fall in specific gravity at 28°C., ·0017. Filtered January 24th, 1910: specific gravity 1·049. Specific gravity in bottle, May 5th, 1910: 1·048. A rich, fruity, sweet perry, with delicate aroma and excellent flavour. Very good unblended, although astringency rather more marked than desirable. During the summer threw a very heavy crust in bottle.

In addition to the above single variety ciders made in bulk in the cider house, about 150 others were prepared on a small scale in the laboratory. The names of the varieties tested may be found in the Report for 1909, in Appendix B, containing the analyses of the juices for the 1909-10 season. All the kinds therein referred to for which the rate of fermentation is stated were thus dealt with. It is not proposed to describe the characters of each cider in this Report; but information respecting individual kinds will be given to anyone interested in them upon application to the Director.

The Washing of Vintage Fruit.

The cider-making season of 1909-10 was considered a suitable occasion, owing to the unfavourable character of the season and the unsatisfactory condition of the fruit available, for testing the effect of washing the fruit before milling. In order to make the test as thorough as possible, practically the whole of the fruit used throughout the season was washed. There being no special apparatus for that purpose available, temporary contrivances had to be arranged. On the whole they proved tolerably efficient. The fruit was first thrown into a large tub of clean water and, after being thoroughly agitated in it, was then transferred to a sloping wooden trough, the base of which consisted of a series of wooden laths placed about $\frac{3}{4}$-inch apart, so as to allow any debris attached to the fruit to fall through, and to facilitate the drainage of the washing water. Diagonally arranged on the base, and alternating on opposite sides, were fixed strips of wood in such a

manner as to cause the fruit to roll from side to side during its passage down the trough, thus further aiding the cleansing of the fruit. As the fruit passed down the trough a constant stream of water was kept playing upon it to wash off any dirt which escaped removal in the washing tub, and to ensure a final rinsing with perfectly clean water. The fruit was finally allowed to drain upon a platform composed of wooden racks, similar to those used in building up a cheese. As far as possible it was arranged for the washing to take place overnight, the fruit being left to drain until the following morning, when it was milled.

It was remarkable to discover the amount of dirt, decaying leaves, grass, and other debris which was removed from the fruit—even when the latter was gathered in good condition and appeared reasonably clean—by this treatment. It appeared that the flavour of the cider must certainly materially benefit; and it was accordingly surprising when, on making two lots of cider from the same heap of fruit, one-half of which was washed and the other left unwashed, it was found that practically no difference in the flavour of the new cider could be detected. As the season advanced, however, especially towards the end of the following summer, the flavour of the cider made from the washed fruit became, perhaps, slightly cleaner than that from the unwashed fruit. It should be stated that the fruit selected for trial was in good condition to start with, and that, therefore, striking differences in the cleanliness of the flavour could hardly have been expected. It ought also to be mentioned that, taking the produce of the season throughout, there was an almost entire absence of taint in the ciders; although in such a season, with so much of the fruit in bad condition, a considerable number of tainted ciders might have been anticipated if the washing had been omitted.

It was found that the specific gravity of the juice did not suffer appreciably as a result of the washing. There may have been occasions when the specific gravity of the fresh juice from the washed fruit was ·001 or ·002 less than that which was obtained from the unwashed fruit; but, taking all cases into consideration, it cannot be said that there was a material loss in gravity as a result of the washing. Certainly the effect was not more pronounced than that arising from fruit naturally wet with rain.

The character of the fermentation was apparently not affected by the washing. The juice from the washed fruit started to ferment almost simultaneously with that from similar fruit unwashed; and as far as could be observed, there was no material difference in the character or the subsequent rate.

It has been suggested that washing may render the cider less

liable to sickness on account of the possible removal of the "sickness" bacilli from the surface of the fruit during the washing. Certainly sickness was rather less prevalent among the ciders last season after the washing than in recent years when the fruit was not washed; but this result may not have been due to the washing. More conclusive and positive evidence is necessary before this result could be considered established. When washing is practised, care must be taken to guard against acetification of the fruit in its wet condition. No detrimental effects were observed so long as the fruit was milled within 24 hours after washing; but appreciable acetification could be detected when the fruit remained in its wet state for longer periods.

On the whole, therefore, while washing produced no very striking results in the case of fruit in reasonably good condition, it was undoubtedly of service where the fruit was in a bad state; and the practice might profitably be adopted by those who have large quantities to deal with, and accordingly are not able to ensure good general condition to the same degree as those who handle smaller quantities. It should be regarded more in the nature of an insurance against taint than of a material improvement, where conditions are fairly good.

The Effect of Maceration of the Pomace.

On several occasions experiments have been made to ascertain how the quality of cider made from pomace pressed immediately it comes from the mill compares with that of cider made from pomace of the same fruit which has been allowed to stand for several hours before being pressed. Some of these have been discussed in previous Reports, and the general results need not be further considered here beyond the mention of the fact that no evidence has been forthcoming to indicate that the juice becomes appreciably richer in sugar as a result of the delay before pressing. At the same time the belief of many of the best cider-makers of past generations in the value of this method of allowing the pomace to stand some time before pressing—or of maceration, as it may be termed—was apparently so firm, that additional investigation seemed called for to explain why similar results were not obtained in the recent experiments.

Repetition of the work has completely confirmed the original results recorded, and it may be now probably taken as established that maceration does not cause any material increase in the amount of sugar in the juice. It was necessary, therefore, to search in other

directions for the alleged beneficial effect of maceration. A number of possible lines of enquiry present themselves. For instance, there may be more opportunity for the delicate fruity flavour and aroma of the apple to diffuse from the peel, in which it so largely resides, into the juice on standing after milling than when the pomace is pressed immediately. There is also the possibility that active chemical changes brought about by the action of the numerous enzymes of the fruit may occur in connection with constituents other than the sugars and sugar-producing substances. On the other hand, such changes, while occurring under certain conditions, may be interfered with or entirely stopped owing to the action of the tannin in the juice upon the enzymes themselves: in which case the result may largely be determined by the amount of tannin present. Other factors deserving consideration are the powers of the more or less acid juice to dissolve substances in the tissues of the fruit pulp not already in a state of solution, and the possible variation of any or all of the actions just enumerated according to the condition of ripeness of the fruit at the time of milling. These various points have been kept in mind and duly considered in the most recent experiments; and it is believed that the results serve to explain to a considerable extent, though not necessarily entirely, why the process of maceration used to be considered so valuable.

In these experiments the effect of maceration of the pomace for different periods of time has been tested. As a rule, when the process of maceration is adopted in practical cider-making, the pomace is allowed to stand for one or, at the most, two days before pressing; but in the trials under consideration this period has been extended in some cases to four days, in others to one week, and in an extreme case to two weeks. In each instance the pomace, the weight of which was generally about 10 cwt., was kept during maceration in a large wooden tub, covered lightly with a lid to prevent free access of air and to retain above the pomace an atmosphere more or less charged with such carbon dioxide as might be produced as the result of fermentation occurring in the pomace, thus tending to retard acetification. During the first experiments it was, however, found that a slight amount of acetification did occur, its extent depending upon the length of time of maceration, in spite of the fact that alcoholic fermentation also took place when the maceration lasted sufficiently long. In later experiments attempts were made to reduce acetification by the addition of an active culture of brewers' yeast to the freshly pressed pomace. These were fairly successful, since alcoholic fermentation set in actively

in the course of a few hours and caused the evolution of sufficient carbon dioxide to prevent serious access of air.

The experiments were not confined to apples of any particular type. They have been carried on with several varieties belonging to the sharp, sweet, and bitter-sweet classes, and the juices have in some instances been of a slow fermenting, and in others of a quick fermenting character. The results have not differed to any material extent in the respective cases, as far as those features which have been under direct observation are concerned; and it is probable that they may be accepted as holding good in general.

It has already been shown in previous Reports that maceration for one or two days renders the juice more easily expressible and tends to increase the yield. It is not necessary to deal further with the proof of those points here; but the later work has shown that maceration under the conditions in the experiments above described does not give necessarily the same results. As a rule the longer the pomace is allowed to macerate beyond a certain point the more difficult the expression of the juice becomes, and consequently the tendency in such cases is towards a lower yield. This seems to be due to the mucilaginous and pectic elements of the tissues of the fruit, which, either as the result of chemical change or of their passage into a state of semi-solution, render the pulp more viscid and, therefore, more difficult to press dry. A condition similar to that of the pomace of over-ripe fruit is in fact reached. A similar state occurred as the result of the addition of brewers' yeast to the freshly pressed pomace, whereby a state of fermentation was rapidly brought about. It is clear, then, that if it is desired to take advantage of maceration to obtain a larger yield of juice, the period of maceration should not be longer than two or, at the outside, three days, and fermentation must not be allowed to start in the pomace.

The juice has in no case been found to have become appreciably richer in sugar as the result of maceration. Definite proof of this is simple and decisive so long as fermentation does not begin in the pomace: but in cases where the latter happens satisfactory proof is difficult, since not only is the sugar being constantly reduced in amount and broken up with the formation of an equivalent quantity of alcohol, but the determination of the amount of the latter formed, in order to calculate the amount of sugar destroyed, is complicated by the fact that a portion of it is in turn oxidised to acetic acid. There is unfortunately no time available for elaborate chemical work in the laboratory during the active cider-making season; and it has not been, therefore, conclusively demonstrated

that sugar has not been formed from the starch, which is always present to a greater or less extent in the pomace during the course of fermentation.

Prolonged maceration leads to no striking changes in the amounts of acid and tannin in the juice. The acidity tends to rise slightly, and the amount of unoxidised tannin becomes slowly and progressively appreciably less ; but it does not appear that these changes have any great significance or influence upon the quality of the cider.

The natural rate of fermentation of the juice is also comparatively little directly affected by maceration ; and there is no reason to suppose that this factor has in itself any important bearing upon the subject. Indirectly, however, owing to the behaviour of the mucilaginous elements of the fruit about to be described, it is concerned.

The juice expressed from freshly milled pomace invariably contains a considerable quantity of mucilaginous or pectic substances. These substances are derived from pectose, a body which enters largely into the composition of the cell walls of tissues of the apple and, as the fruit ripens, is converted, progressively, under the agency of enzymes of the fruit, into a series of compounds which differ in their degree of solubility and their behaviour with acids and alkalies as well as their behaviour under the action of enzymes. The condition of ripeness of the fruit at the time of milling is responsible for the nature of the mixture of these substances and the amounts of each in the juice. Their behaviour in the juice varies, some being deposited in an insoluble form as a flocculent precipitate, others being converted into sugars or related, possibly fermentable bodies, and others again being coagulated with the formation of a jelly-like clot, when present in sufficient quantity and under suitable conditions. The history of these bodies in the juice has, therefore, considerable bearing upon the quality of the cider. They are largely concerned in the natural clarification of the cider, and on that account can influence to an important degree the course of fermentation. When, for instance, a cider " drops bright " naturally, this phenomenon is due to the formation of a jelly-like clot by some of those substances ; and if the clarified cider is carefully racked off from the clot, the fermentation is considerably, and in many cases, permanently checked. If the fruit is suitable, and is milled at the critical state of ripeness, the amount of these substances sooner or later thrown out of solution and deposited in flocculent or clot-like form is so great that it acts as effectively as a treatment with " finings," and constitutes a natural clarifying agent. The experiments on maceration have shown that such treatment has a

marked effect upon the mucilaginous substances of the fruit. A larger quantity of these bodies becomes dissolved in the juice, especially apparently those which are later precipitated. Consequently the juice from macerated pomace throws, as a rule, a much heavier and more flocculent deposit than that from unmacerated pomace, and is capable of clearing itself more thoroughly, and, generally, more quickly. On that account fermentation is checked by purely natural means at an earlier stage on the average, and the cider produced, therefore, tends to be of a richer type. It seems very probable, therefore, that it is for this reason that in past days, before the filter came in vogue, and when, accordingly, racking was the general means for regulating fermentation, maceration was regarded with so much favour. The introduction of the filter, however, has so completely modified the procedure for arresting fermentation that this effect of maceration appears at first sight no longer of such primary importance. Such a conclusion, however, is premature. During the course of the past season's work it has been observed that ciders made from macerated pomace can be filtered at an earlier stage of fermentation, and with more thoroughness, than ciders made from pomace pressed immediately after milling. This is not, perhaps, a very important point where ciders fermenting at a moderate or slow rate of fermentation are concerned, since there is usually little difficulty in checking fermentation by filtration at any desired point in such cases: but it is undoubtedly valuable for those ciders, which normally ferment so rapidly that filtration is either impossible or absolutely ineffective until fermentation has practically ceased, and all sweetness been destroyed. A means of effective filtration at a comparatively early stage of fermentation will be a great boon to the cider-maker; and it is probable that in many cases maceration will be found to afford that means. One set of experiments with Morgan Sweet apples at the Institute this season has given particularly striking results. There are, perhaps, no apples more difficult to deal with from the cider-maker's point of view. Not only is the rate of fermentation of the juice normally extremely rapid, but also the fruit ripens so early in the season that the temperature is generally high and favourable to rapid fermentations. Thus the experiments constituted as severe a test as possible. The pomace was taken from the mill and divided at once into two lots, one of which was pressed immediately, and the other, C, allowed to macerate, with the addition of brewers' yeast, for seven days. The juice from the former was divided into two portions, the one being allowed to ferment naturally, and the other, B, fermented

with brewers' yeast. Each cider was then filtered after two weeks, when the specific gravity had dropped to 1.016—1.020. The filtration of the unmacerated cider fermented naturally was a failure, it being impossible to check fermentation at that stage and to clarify the liquor. It was then divided into two lots, A and D, the former being allowed to pursue its normal course with eventual filtration when practicable, which resulted in a dry coarse cider of specific gravity, 1.003. The latter, D, was added to the pressed pomace of some mixed local fruit of rather sharp character, and allowed to macerate with it for twenty-four hours, after which it was expressed and at once filtered. Thorough filtration was accomplished with ease, and the cider was eventually maintained without difficulty at a gravity of 1.020. The other two lots, B and C, filtered well, and although renewed fermentation set in slightly, a second filtration sufficed to stop it permanently, and to retain the gravity, in the case of C at 1.015, and of B at 1.012. Subsequent experience has shown that the gravities of B, C, and D, could probably have been maintained at 1.025 at least. As to the merits of the respective ciders there is no question that the three latter were far superior to A. The case of B is interesting, since no maceration in that instance occurred ; and the result must be attributed solely to the use of the brewers' yeast, which not only dominated the fermentation, but crowded out the smaller natural yeasts, and rendered filtration easy, presumably on account of its larger size. It may be argued, therefore, that the reason of the good result in the case of C was also due to the brewers' yeast used. It is to be regretted that the supply of fruit available was not sufficient to allow of another lot of cider being made with maceration and natural fermentation ; but taking in consideration the results of other experiments and the fact that C was a slightly superior cider to B, there can be little doubt that the maceration proved of service in aiding filtration at the height of fermentation, and materially assisted in producing a good result. D cannot very well be compared in the same way, since by re-soaking in the pressed pomace of another lot of fruit, some juice of a different character was introduced. It does, however, illustrate the value of maceration from this point of view, and indicates that the method of re-soaking, which has been referred to in previous Reports as being so useful in improving the quality of poor and tainted ciders, depends partly upon the effect of maceration in aiding filtration for its value.

The above results have been obtained with ciders made from separate varieties of apples. No mixtures have thus far been tried.

It is, however, extremely likely that they may yield more striking results. It is known that the kind and amount of the mucilaginous substances brought into solution in the juice from the tissues of the fruit depend upon the degree of acidity of the juice. It seems probable, therefore, that if the pomace of a sharp variety is added to that of a sweet or bitter-sweet variety, the additional acidity of the former will result in the solution of additional matter from the latter. How far this could be turned to practical use remains to be seen; and it must be left to next season's work to settle that point.

The question of the effect of maceration upon flavour remains to be considered. The results in this direction have been rather contradictory, and ought not to be accepted as conclusive. Generally speaking, the flavour of the cider made from macerated pomace is for the first few months somewhat softer and, perhaps, a trifle more fruity than that made from unmacerated pomace. As the summer advances, however, and particularly towards the following autumn, a new feature of flavour of a slightly disagreeable or unsound character frequently develops in the macerated cider and renders it rather inferior to the other. How far this is a regular feature of macerated ciders, and whether or not it can be avoided by any means, remain to be determined.

Observations on the Effects of Sulphuring.

In certain of the cider-making districts the practice of sulphuring cider at some stage during the course of its manufacture in order to check fermentation is still generally accepted as a part of the normal routine. The custom is a very old-established one and is on that account regarded by many as legitimate, in spite of the general trend of feeling that it is desirable in the best interests of the cider-making industry to discourage the indiscriminate use of preservatives. The form in which sulphur is used varies; but in all cases it depends for its effectiveness upon the action of its compound with oxygen, sulphur dioxide, either in a free state or in combination with an alkali. The commonest practice is to burn a sulphur match inside a cask containing a small quantity of cider, allowing the latter to absorb the fumes of sulphur dioxide which are produced by its combustion. Used in this manner one of the main disadvantages is that the strength of the dose necessarily varies considerably, and cannot easily be regulated; so the maker cannot be certain that it is sufficiently powerful to achieve the desired object and at the same time is not excessive. While sulphur dioxide, free

or combined, possesses undoubted and considerable antiseptic properties, it differs in many respects from other preservative substances commonly used in foods and beverages, the most important of which, from the point of view under discussion, is that it undergoes various changes in course of time in the liquor, and therefore its effects as a preservative are not permanent, unless it is used in large excess. For that reason and, in addition, owing to its use within limits being sanctioned in the preparation of other fermented beverages, it has to be regarded in a different manner from other preservatives ; and the question whether its use in cider-making should be discouraged or legalised ought not, perhaps, to be settled off-hand on the score of its status as a preservative, but rather from the point of view as to its actual value for cider purposes. Some investigations have, therefore, been carried on during the past two years to ascertain as nearly as possible what effects sulphuring has upon cider, and whether or not they are sufficiently useful to outweigh objections to its use, which may be raised for hygienic and other reasons.

A detailed account of the experiments will be published elsewhere, since it would be too lengthy and hardly of a suitable character for this Report ; but the following summary of the results may be given.

The effects of sulphuring may be divided into three classes, those bearing directly upon the rate of fermentation, those concerned with its influence upon the different kinds of organisms in the cider, and those dealing with various chemical changes directly or indirectly due to it.

The effect of sulphuring upon the rate of fermentation of the juice has been very clearly elucidated as a result of this work. It was already well known that sulphuring resulted in a check to fermentation, and that the heavier the dose the more complete was the check ; but many inconsistencies and irregularities in its action have been experienced. Such cases can now be explained. The first point established has been that it is the natural rate of fermentation of the juice or cider which determines the effect of a given dose of sulphur dioxide. If the rate of fermentation is naturally rapid, a much stronger dose is required to bring fermentation temporarily to a standstill than in cases where the rate of fermentation is slow ; and it may be stated as a general rule, with a very fair degree of accuracy, that the size of the dose required is directly proportional to the degree of rapidity of the natural rate of fermentation. The second rule discovered is that when fermentation has been temporarily arrested by sulphuring, the time

which elapses before renewal of fermentation sets in depends not only upon the size of the dose, but also upon the natural rate of fermentation of the juice or cider. Thus, if the fermentation of two ciders is temporarily stopped by the administration of a given amount of sulphur dioxide, fermentation will set in again first in the cider which naturally ferments the faster. The third point noted was that in all cases when renewed fermentation set in as the effect of the sulphuring wore off, the subsequent rate of fermentation was practically the same as that of the same juice or cider unsulphured. This rule appears to hold good unless the dose of sulphur dioxide is proportionately very heavy—sufficient to impair the flavour permanently—or frequently repeated. The greater part of the work was conducted at the same temperature in order that all results could be strictly compared; but a few experiments indicate that the temperature of the cider has a great deal to do with the length of time during which the effect of a given dose of sulphur dioxide will last. Apparently the higher the temperature the more quickly the action of sulphuring in checking fermentation will pass off.

It is, therefore, clear that the result of sulphuring to check fermentation depends to a very great degree upon the character of the cider treated: and it is also plain that heavy doses are necessary for ciders whose character of rapid fermentation renders a check of some kind desirable, if any appreciable and beneficial effect is to be obtained. Heavy doses, however, cannot be recommended under any circumstances. Dr. H. E. Durham, in a recent paper, has dealt with the hygienic and medical aspect of this subject, and has made out a strong case for a legal limitation of the amount of sulphur dioxide allowable. It is certain that the dose required to deal effectively with a rapid fermenting cider would exceed such an amount. Taking this into consideration, together with the fact that the fermentation of the slowly fermenting ciders can be generally adequately controlled without sulphuring, there does not appear in be much in favour of sulphuring as a means of checking fermentation.

Some of the results appear to show that the action of a given dose in checking fermentation administered at a comparatively late stage in the fermentation of a cider is decidedly more powerful than when added to the freshly pressed juice or during the early stages of fermentation of the same cider. Further proof is, however, required, since the amount of attention given thus far to this point has been limited.

The influence of sulphuring upon the different kinds of organisms

present in the juice or cider has not yet received much attention; but enough has been observed to indicate that it is possible that sulphuring may have a far greater value in this direction than in that of checking the rate of fermentation. The efficacy of sulphuring in the latter respect is due to its direct action upon the yeasts and other organisms of fermentation in the cider. It has an injurious effect upon their rate of growth and upon their various activities. If the dose is strong enough they are killed outright or permanently injured; but if it is below that strength the extent of the injury is proportionally reduced, and the time required to recover is similarly affected. It has been claimed by several authorities that it is possible to acclimatise certain yeasts to comparatively high strengths of sulphur dioxide and to obtain active fermentation, therefore, under such conditions in a manner impossible without such acclimatisation. As might be anticipated, different kinds of yeasts and bacteria possess different powers of resistance to the influence of sulphur dioxide. Consequently, when a cider is sulphured, the mixture of organisms which it contains suffers a kind of weeding-out process. The kinds which are very susceptible to the injurious influence of the antiseptic suffer most severely and are, therefore, handicapped in the struggle for existence in the liquor, while the more resistant forms are comparatively little affected and are able to develop at the expense of the others. The possible importance of this selective action is obvious. If a juice is lightly sulphured immediately it comes from the press or within a day or two, before the organisms have had much opportunity to multiply, the sulphuring, by checking the development of the inferior yeasts and bacteria and allowing the disproportionate increase of the stronger yeasts at their expense, may be the means of promoting a much purer and better type of fermentation. The results thus far available indicate this possibility, since the few observations already made point to the probability that the alleged undesirable *apiculatus* yeasts, acetic bacteria, and the bacilli of cider sickness, are more susceptible than the strong vinous yeasts of the *ellipsoideus* type.

Sulphuring has also a considerable bearing upon the quality of cider in another direction. The chemical changes occurring in the juice are in certain cases affected, and the flavour and nature of the mature cider are therefore concerned. It has been found in these experiments that many juices "dropped bright" at an early stage after sulphuring, but were unable to do so unsulphured. In other instances, where the unsulphured juices "dropped bright" naturally, the same kinds did so more quickly and more thoroughly when

sulphured. The colour of cider is also affected, sulphured cider being invariably of a paler tint than the same sort unsulphured. It is also asserted by some makers that sulphured cider will not blacken ; but although this work has indicated that the kinds experimented upon were not liable to discoloration, it has not been extensive enough to allow of absolute confirmation of that assertion. With regard to flavour and aroma there is no doubt that sulphuring is responsible for a certain character not obtained otherwise. Reference is not made here to the actual flavour and odour of the sulphurous acid itself, since it is rightly considered that if the dose has been strong enough to leave a permanent flavour of the sulphur dioxide in the cider, the quality of the liquor is correspondingly impaired. But if the liquor in the earliest stages of fermentation is very lightly sulphured, there is no noticeable trace of the substance in the flavour of the finished product, although the characteristic features of flavour and aroma referred to stand out distinctly. These are due, in part at any rate, to the substances formed by the combination of the sulphurous acid with various aldehydes formed during fermentation, and probably also in part to the different type of fermentation due to the repression of the *apiculatus* yeasts and acetic and other bacteria.

Briefly summarising the results, it may be concluded that sulphuring should not be considered a satisfactory practice for the preparation of sweet cider since, if fermentation is to be checked sufficiently, and not merely temporarily, an objectionably heavy dose is necessary in the case of rapidly fermenting juices, and there are other and less questionable means of checking fermentation in the cases of juices with slower rates of fermentation. There are, however, possibilities in other directions in favour of a light sulphuring of the fresh juices. A purer type of fermentation and, therefore, a superior product, may be found to result ; and considerable assistance in the natural clarification of the ciders may be obtained.

The Influence of the Intermediate Stock on the Quality of Vintage Fruit.

In the Reports for 1908 and 1909 this question has been discussed, and the analyses of the juices of Dabinett apples taken from trees where this variety has been head-worked on different intermediate stocks have been recorded. No satisfactory deductions were found possible, the variations in quality observed, although considerable in extent in some cases, being irregular and not obviously connected with

the nature of the stock. It was recognised that the records would require to be taken over a number of seasons if any decisive conclusions were to be established. The records for 1910, given in the accompanying table, together with those of 1908 and 1909 for comparison, although presenting some features of interest and exhibiting in certain instances some degree of uniformity, nevertheless on the whole serve to complicate still further, rather than to simplify, the problem. It is evidently premature to endeavour to formulate conclusions, and discussion is therefore postponed until next season's results are available. It may here conveniently be stated that considerable doubt is felt that the methods of analysis and the modes of examination of the fruit at present utilised are adequate for purposes of investigations of this character; and it will probably be found necessary to devote a considerable amount of time next season to the elaboration of methods capable of giving a more real and exact measure of the comparative qualities of different samples of fruit.

The Relations between the Vintage Quality of the Fruit and the Methods of Treatment of the Trees.

The remarks which have been made above with regard to the influence of the intermediate stock apply equally to this subject. The results are not regular enough to render any discussion profitable at present. The records for 1910 are, however, given in the appended table so that those who are interested in this particular line of work may follow the variations from season to season.

The Composition of Dabinett Juices from Different Intermediate Stocks.

Variety of Intermediate Stock.		Composition of Juice, 1908.			Composition of Juice, 1909.				Composition of Juice, 1910.			
		Specific Gravity.	Malic Acid, per cent.	Tannin, per cent.	Specific Gravity.	Malic Acid, per cent.	Tannin, per cent.	Daily fall in Specific Gravity at 27 deg. C.	Specific Gravity.	Malic Acid, per cent.	Tannin, per cent.	Daily fall in Specific Gravity at 27 deg. C.
Annie Elizabeth	Tree 1	—	—	—	1.056	.22	.136	9	1.065	.19	.240	11.2
Do.	Tree 2	1.0565	.20	.268	1.057	.22	.212	12	1.062	.20	.214	13.2
Blenheim Orange	Tree 1	1.057	.24	.374	1.055	.21	.240	10.2	1.059	.19	.264	12.0
Do.	Tree 2	1.0625	.15	.364	1.057	.19	.204	—	1.067	.20	.318	10.7
Bramley's Seedling	Tree 1	1.0665	.17	.382	1.049	.19	.256	9.2	1.057	.18	.194	14.7
Do.	Tree 2	1.062	.26	.324	1.053	.22	.182	12	1.061	.19	.206	10.7
Broadleaf Jersey	..	1.075	.12	.308	1.057	.20	.196	11.7	1.055	.19	.236	14.0
Broadleaf Norman	..	1.062	.24	.364	1.052	.25	.176	10.2	1.057	.23	.260	13.5
Court Royal ..	..	1.059	.18	.364	1.053	.24	.260	10.2	1.058	.21	.234	11.2
Ecklinville	Tree 1	1.0645	.19	.332	1.052	.23	.164	12	1.059	.20	.234	13.2
Do.	Tree 2	1.065	.17	.282	1.056	.23	.210	10.7	1.056	.20	.232	11.0
Hardwicke ..	..	1.064	.24	.356	1.050	.20	.138	10.2	1.056	.21	.198	14.7
Hollow Core ..	..	1.064	.23	.304	1.054	.23	.188	9.5	1.060	.20	.256	13.5
King of the Pippins	..	1.064	.20	.290	1.055	.21	.176	13	1.055	.21	.260	9.5
Morgan Sweet	Tree 1	1.064	.19	.414	1.056	.21	.212	6	1.055	.14	.176	5.0
Do.	Tree 2	1.0655	.18	.374	1.057	.21	.180	7	1.058	.18	.168	5.4
Do.	Tree 3	1.0625	.25	.348	1.058	.22	.156	7	1.059	.21	.230	6.7
Do.	Tree 4	1.063	.19	.420	1.056	.20	.176	10.7	1.060	.17	.246	6.4
Do.	Tree 5	1.060	.16	.334	1.055	.22	.180	11.2	1.060	.21	.216	6.9
Do.	Tree 6	—	—	—	1.050	.22	.180	17.5	1.058	.20	.262	9.5
Newton Wonder ..	Tree 1	1.073	.18	.384	1.057	.21	.212	9.7	1.063	.19	.266	—
Do.	Tree 2	1.0535	.26	.274	1.050	.20	.196	8	1.067	.17	.318	—
Do.	Tree 3	1.0665	.21	.344	1.050	.21	144	8.7	1.063	.19	.248	4.9
Do.	Tree 4	—	—	—	1.051	.21	.160	9.2	1.059	.18	.264	14.5
Peasgood's Nonsuch	..	1.049	.21	.208	1.050	.24	.152	13	1.058	.21	.220	13.2
Sweet Alford ..	..	1.065	.30	.346	1.054	.24	.096	12.5	1.057	.17	.228	13.0
Warner's King	Tree 1	1.065	.18	.290	1.052	.22	.152	9.5	1.058	.18	.134	15.2
Do.	Tree 2	1.0785	.22	.374	1.053	.22	.248	11.2	1.064	.17	.294	12.2
Grafted on Paradise Stock		—	—	—	1.055	.18	.144	11	—	—	—	—

Name of Variety.	Number of Tree.	Specific Gravity of Juice.	Percentage Composition of Juice.		Daily Fall in Specific Gravity at 27 deg.C.	Method of Treatment of Tree.
			Malic Acid.	Tannin.		
APPLES.						
Black Norman	2	1·050	·46	·206	—	Grass removed within radius of 3ft.
Ditto	4	1·047	·62	·188	—	Ditto 4ft. 6in.
Ditto	5	1·055	·43	·208	—	Ditto 3ft.
Broadleaf Jersey	1	1·055	·34	·348	12·7	Ditto 4ft. 6in.
Ditto	3	1·055	·37	·376	—	Grass allowed to grow to base of tree.
Ditto	4	1·051	·55	·334	15·7	Grass removed within radius of 4ft. 6in.
Bedan des Par'es	1	1·048	·25	·254	—	Grass allowed to grow to base of tree.
Ditto	2	1·046	·26	·260	—	Grass removed within radius of 4ft. 6in.
Broadleaf Norman	1	1·054	·22	·164	11·2	Ditto 4ft. 6in.
Ditto	2	1·051	·26	·256	10·4	Ditto 3ft.
Ditto	3	1·048	·21	·222	10	Grass allowed to grow to base of tree.
Ditto	4	1·049	·24	·272	10	Grass removed within radius of 4ft. 6in.
Ditto	6	1·054	·24	·256	9·4	Ditto 4ft. 6in.
Ditto	8	1·036	·15	·128	—	Ditto 3ft.
Ditto	9	1·042	·16	·148	—	Ditto 3ft.
Ditto	10	1·046	·21	·210	—	Grass allowed to grow to base of tree.
Cap of Liberty (on Morgan Sweet stock) ..	1	1·051	·95	·264	7·0	Grass removed within radius of 4ft. 6in.
Ditto	2	1·055	1·15	·288	7·0	Ditto 3ft.
Ditto	3	1·057	1·56	·338	—	Grass allowed to grow to base of tree.
Ditto	4	1·056	1·52	·328	—	Grass removed within radius of 4ft. 6in.
Ditto	5	1·054	1·34	·310	8·6	Ditto 3ft.
Ditto (on King of Pippins stock) ..	1	1·048	1·13	·218	6·4	Ditto 4ft. 6in.
Ditto	2	1·046	1·13	·264	5·7	Ditto 3ft.
Ditto	3	1·050	1·24	·248	6·3	Grass allowed to grow to base of tree.
Ditto	4	1·050	1·23	·274	6·7	Grass removed within radius of 4ft. 6in.
Ditto	5	1·050	1·21	·254	6·4	Ditto 3ft.
Ditto (on Broadleaf Jersey stock) ..	—	1·050	1·18	·262	6·1	Ditto 4ft. 6in.

Cherry Norman	1	1·048	·21	·256	7·8	Grass removed within radius of 4ft. 6in.
Ditto	2	1·052	·18	·278	—	Ditto 3ft.
Ditto	3	1.048	·23	·278	7·6	Grass allowed to grow to base of tree.
Ditto	4	1·045	·24	·240	—	Grass removed within radius of 4ft. 6in.
Ditto	5	1·048	·21	·224	11·7	Ditto 3ft.
Ditto	6	1·042	·20	·184	—	Ditto 4ft. 6in.
Ditto	7	1·042	·19	·192	—	Ditto 4ft. 6in.
Ditto	8	1·042	·18	·196	7·5	Ditto 3ft.
Ditto	10	1·038	·23	·200	8·5	Grass allowed to grow to base of tree.
Chisel Jersey	1	1·058	·24	·400	7·7	Grass removed within radius of 4ft. 6in.
Ditto	2	1·062	·22	·580	5·9	Ditto 3ft.
Ditto	5	1·055	·28	·278	5·1	Ditto 3ft.
Court Royal	1	1·047	·21	·108	13·3	Ditto 4ft. 6in.
Ditto	2	1·047	·22	·118	14·0	Ditto 3ft.
Ditto	3	1·049	·20	·124	14·3	Grass allowed to grow to base of tree.
Ditto	4	1·048	·26	·114	15·0	Grass removed within radius of 4ft. 6in.
Cowarne Red	1	1·045	·71	·190	11	Ditto 4ft. 6in.
Ditto	2	1·044	·74	·238	8·9	Ditto 3ft.
Ditto	3	1·046	·73	·178	—	Grass allowed to grow to base of tree.
Ditto	4	1·045	·73	·250	—	Grass removed within radius of 4ft. 6in.
Ditto	7	1·046	·64	·242	—	Ditto 4ft. 6in.
Ditto	9	1·045	·68	·222	—	Ditto 3ft.
Ditto	10	1·042	·67	·224	11·3	Grass allowed to grow to base of tree.
Cremiere (on Morgan Sweet stock)	—	1·047	·30	·178	9·8	Grass removed within radius of 3ft.
Ditto (on Warner's King stock)	—	1·041	·33	·188	17·5	Ditto 4ft. 6in.
Dymock Red	1	1·055	·45	·104	—	Ditto 4ft. 6in.
Ditto	2	1·055	·46	·106	—	Ditto 3ft.
Ditto	4	1.052	·46	·114	—	Ditto 4ft. 6in.
Ditto	5	1·052	·50	·122	12	Ditto 3ft.
Doux Amer (on Broadleaf Jersey stock)	—	1·054	·54	·194	—	Ditto 4ft. 6in.
Eggleton Styre	1	1·056	·32	·124	—	Ditto 4ft. 6in.
Ditto	2	1·058	·38	·170	8·0	Ditto 3ft.
Ditto	3	1·052	·34	·154	12	Grass allowed to grow to base of tree.
Ditto	4	1·047	·28	·102	—	Grass removed within radius of 4ft. 6in.
Ditto	6	1·048	·26	·104	—	Ditto 4ft. 6in.
Ditto	8	1·054	·28	·112	—	Ditto 3ft.

Name of Variety.	Number of Tree.	Specific Gravity of Juice.	Percentage Composition of Juice.		Daily Fall in Specific Gravity at 27 deg.C.	Method of Treatment of Tree.
			Malic Acid.	Tannin.		
APPLES—*continued*						
Egleton Styre	9	1·052	·29	·112	—	Ditto 3ft.
Ditto	10	1·050	·31	·118	—	Grass allowed to grow to base of tree.
Ditto (Old Orchard)	—	1·047	·29	·112	—	Ditto.
Frequin Audievre	1	1·051	·19	·312	—	
Ditto	2	1·054	·17	·286	—	
Kingston Black	1	1·058	·46	·290	—	Ditto 4ft. 6in.
Ditto	2	1·049	·50	·108	—	Ditto 3ft.
Ditto	3	1·051	·47	·126	—	Grass allowed to grow to base of tree.
Ditto	5	1·058	·43	·218	—	Grass removed within radius of 3ft.
Ditto (on Broadleaf Jersey stock) ..	—	1·052	·47	·096	5·6	Ditto 3ft.
Knotted Kernel	1	1·058	·19	·308	5·2	Ditto 4ft. 6in.
Ditto	2	1·055	·20	·272	5·9	Ditto 3ft.
Ditto	3	1·055	·22	·248	7·5	Grass allowed to grow to base of tree.
Ditto	4	1·058	·19	·278	6·2	Grass removed within radius of 4ft. 6in.
Ditto	5	1·070	·23	·306	—	Ditto 3ft.
Ditto	6	1·059	·21	·308	4·7	Ditto 4ft. 6in.
Ditto	7	1·062	·22	·348	4·2	Ditto 4ft. 6in.
Ditto	8	1·061	·20	·310	6·4	Ditto 3ft.
Ditto	9	1·060	·24	·276	5·2	Ditto 3ft.
Ditto	10	1·060	·20	·368	—	Grass allowed to grow to base of tree.
Masters' Jersey	1	1·055	·31	·336	18	Grass removed within radius of 4ft. 6in
Ditto	2	1·056	·39	·290	10·2	Ditto 3ft.
Ditto	5	1·056	·22	·362	8·8	Ditto 3ft.
Medaille d'Or	1	1·054	·38	·512	13·3	Ditto 4ft. 6in.
Ditto	2	1·052	·30	·508	14·0	Ditto 3ft.
Ditto	3	1·058	·30	·628	18·7	Grass allowed to grow to base of tree.
Ditto	4	1·066	·33	·840	17·7	Grass removed within radius of 4ft. 6in.

Medaille d'Or	5	1·061	·33	·808	18·7	Grass removed within radius of 3ft.
Ditto	6	1·062	·28	·724	20·3	Ditto 4ft. 6in.
Ditto	7	1·060	·33	·688	18·7	Ditto 4ft. 6in.
Ditto	8	1·060	·31	·708	—	Ditto 3ft.
Ditto	9	1·059	·27	·660	13·3	Ditto 3ft.
Ditto	10	1·058	·33	·656	17·3	Grass allowed to grow to base of tree.
Ditto (on Broadleaf Jersey stock) ..	—	1·052	·28	·484	15·7	Grass removed within radius of 4ft. 6in.
Ditto (Nursery)	—	1·054	·25	·560	13·3	In cultivated ground.
Neverblight	2	1·053	·63	·132	—	Grass removed within radius of 3ft.
Reinette Obry (on Morgan Sweet stock) ..	1	1·046	·69	·078	9·2	Ditto 4ft. 6in.
Ditto	3	1·043	·60	·084	12·7	Grass allowed to grow to base of tree.
Rouge de Treves (on Warner's King stock)	—	1·043	·92	·102	12·3	Grass removed within radius of 3ft.
Ditto (on Hardwicke stock) ..	—	1·042	·94	·100	10·7	Ditto 4ft. 6in.
Royal Jersey (on Broadleaf Jersey stock)..	—	1·053	·31	·234	10·4	Ditto 3ft.
Strawberry Norman	3	1·050	·34	·324	8·2	Grass allowed to grow to base of tree.
Ditto	6	1·055	·33	·420	8·7	Grass removed within radius of 4ft. 6in.
Ditto	7	1·057	·37	·440	6·5	Ditto 4ft. 6in.
Ditto	9	1·057	·41	·408	7·8	Ditto 3ft.
Ditto	10	1·054	·40	·368	7·2	Grass allowed to grow to base of tree.
Skyrme's Kernel	1	1·042	·60	·240	—	Grass removed within radius of 4ft. 6in.
Ditto	2	1·039	·63	·284	7·5	Ditto 3ft.
Ditto	3	1·039	·68	·256	7·8	Grass allowed to grow to base of tree.
Ditto	7	1·047	·54	·268	14·6	Grass removed within radius of 4ft. 6in.
Ditto	8	1·047	·74	·306	—	Ditto 3ft.
Ditto	10	1·041	·63	·240	9·2	Grass allowed to grow to base of tree.
Ditto (Nursery)	—	1·051	·56	·160	—	In cultivated ground.
Sweet Alford (on King of Pippins stock) ..	1	1·057	·22	·150	11·6	Grass removed within radius of 4ft. 6in.
Ditto	2	1·058	·22	·140	—	Ditto 3ft.
Ditto	3	1·060	·21	·176	11·2	Grass allowed to grow to base of tree.
Ditto	4	1·060	·21	·134	—	Grass removed within radius of 4ft. 6in.
Ditto	5	1·060	·23	·218	11·8	Ditto 3ft.
Ditto (on Ecklinville stock).. ..	1	1·061	·28	·138	—	Ditto 4ft. 6in.
Ditto	2	1·063	·26	·148	—	Ditto 3ft.
Ditto	4	1·058	·20	·106	11·8	Ditto 4ft. 6in.
Ditto	5	1·052	·21	·094	10·6	Ditto 3ft.
Ditto (on Broadleaf Jersey stock)..	—	1·054	·22	·108	—	Ditto 3ft.

Name of Variety.	Number of Tree.	Specific Gravity of Juice.	Percentage Composition of Juice.		Daily Fall in Specific Gravity at 27 deg.C.	Method of Treatment of Tree.
			Malic Acid.	Tannin.		
APPLES—						
White Jersey (on Broadleaf Jersey stock)	1	1·050	·17	·156	4·6	Ditto 4ft. 6in.
Ditto	2	1·052	·16	·114	4·7	Ditto 3ft.
Ditto	5	1·050	·39	·082	10·2	Grass allowed to grow to base of tree.
PEARS.						
Oldfield	1	1·045	·51	·090	—	Grass removed within radius of 4ft. 6in.
Ditto	2	1·047	·48	·068	—	Ditto 3ft.
Ditto	3	1·048	·50	·060	—	Grass allowed to grow to base of tree.
Ditto (Nursery)	—	1·046	·39	·066	—	In cultivated ground.
Taynton Squash	3	1·046	·44	·068	7·2	Grass allowed to grow to base of tree.

INVESTIGATIONS ON FRUIT CULTURE.

Fruit Breeding Investigations.

Recent work in plant breeding has indicated such far-reaching possibilities and has opened up so many new lines of research that the state of the subject has been completely revolutionised. Instead of the uncertainty hitherto associated with the attempts to produce new varieties combining certain desired features the laws originally propounded by Mendel, and substantiated and elaborated by the studies of Bateson, Biffen, and a number of other workers on plants of agricultural and horticultural importance have demonstrated the possibility of raising new types with a remarkable degree of control over the results. Although the subject is still in its infancy, the manner by which certain distinguishing characters of a variety can be fixed and combined in one hybrid with other characters of a related variety in the course of a comparatively few generations has been ascertained; and it is therefore possible to raise crosses combining desired characters of several different varieties, provided that the characters concerned are capable of transmission according to Mendelian laws. Thus, for example, Biffen has been able to raise hybrid wheats combining the good cropping qualities of one variety with the "strength" of another variety and the disease-resistant powers of a third sort. Very little knowledge is available thus far with regard to the breeding of fruit on these lines; and positive results in the case of fruits like apples and pears, which require several seasons' growth from the seedling to the fruiting stage and will not come true from seed, cannot be expected for many years, since several generations must first be raised. At the same time the possibilities are so great that the subject calls for special and immediate attention. It may not be impossible eventually by working according to Mendelian rules, to raise varieties of apple combining, for instance, the vigour of growth and disease-resistant power of Bramley's Seedling with the cropping qualities of Lane's Prince Albert, the flavour of Cox's Orange Pippin, and the colour of Worcester Pearmain, unless subsequent research shows the co-existence of certain of those characters in one variety to be impossible.

For the past two seasons fruit breeding work of this character has been in progress at the Institute. At present attention is being confined to apples and strawberries. The apple breeding work will be of double interest, since it not only concerns market fruit culture, but also has a considerable significance from the cider-

making point of view. About 100 one-year-old plants from selected crosses have been raised, and they are now large enough to be grafted on the Paradise stock. In the course of three or four years they will reach the fruiting stage, and will then be self-fertilised to produce the second generation, which promises to be the critical one, and the stage at which the actual possibilities of the work can first be satisfactorily estimated. Since it will probably be at least ten years hence before the second generation seedlings bear fruit, considerable patience for results must be exercised. Meanwhile a large number of seedlings, the male parents of which are unknown, are being raised in the hope of ascertaining from the first generation some of the laws governing the transmission of various individual characters. In addition, another batch of seedlings from selected crosses is being brought on to supplement the first set. The experiments with strawberries will furnish results more quickly. The varieties which have been intercrossed include Royal Sovereign, Monarch, Leader, British Queen, Givon's Late Prolific, and St. Antoine de Padoue. Over 70 seedlings from the crosses are of the size of first year runners and will possibly fruit in 1911, and enable the second generation to be obtained in fruiting condition a year or two later. A very large number of smaller seedlings at various stages of development are also coming on, and may be expected to fruit in 1912.

During the course of the work much information has been collected with regard to the powers of self and cross-fertilisation of different varieties of apples. It is desired to obtain more complete data before the publication of detailed statistics; but it is evident that, as recent experience in this country and abroad has proved, there are great differences between the varieties in this respect, and that, generally speaking, cross-fertilisation is essential if a good set of fruit is to be obtained. Not only are the large majority of varieties more or less self-sterile, but also it appears that some varieties are practically sterile to the pollen of other kinds.

Spraying Experiments with Bordeaux Mixture.

Arising from the general trials of spray fluids conducted regularly at the Institute, special attention has been directed during the past summer to experiments on the use and mode of action of Bordeaux Mixture as a fungicide. The chemistry of this spray fluid is complicated, and was not properly appreciated until the publication of Pickering's work of the last three or four years. These investigations have thrown new light on the subject, and have led to certain

modifications in the composition of the mixture. According to theory the revised mixture should prove more effective, as well as being more economical, than the older ones; but the test of practical experience has not yet given a decisive answer either way.

The results of the practical spraying experiments at the Institute have already been published in Leaflet No. 5, and therefore need not be further discussed here. Those of the laboratory experiments, which were carried on in collaboration with Mr. C. T. Gimingham, F.I.C., of Bristol University, have been published in the Journal of Agricultural Science. Reference to these will therefore be limited to such general results as have some bearing upon the practical use of Bordeaux Mixture.

The main point elucidated is that the copper compound which is deposited by spraying as a thin film or coating on the foliage of the plant possesses direct fungicidal properties without the need of atmospheric agencies to bring it into an active condition; but at the same time direct contact between the fungus and a particle of the substance is necessary to prevent the growth of the former. Hence Bordeaux Mixture may be regarded as capable of serving as an active protection from the moment of its application to the plant; but at the same time the degree of protection which it affords depends upon the manner of its distribution over the surface of the foliage. Every portion of the surface not covered by the copper deposit is liable to infection; consequently the more thoroughly the copper film coats the foliage the more efficient will be the results. To ensure a thorough coating it is important that the spray should be administered in the finest form possible,—a proper Bordeaux nozzle on the spraying apparatus being therefore required,—and that the particles of the copper compound should be in an extremely fine state of division, and not of a coarse character. This can be accomplished by care in the preparation of the mixture, for details of which reference may be made to Leaflet No. 6, published by the Institute. In spraying it is also important not to drench the trees with the fluid, otherwise the copper compound will not be evenly deposited, and much of it will be wasted in the drip from the leaves. The advantages of a second spraying when the original coating of the copper is beginning to wear off can also be understood.

These points have been hitherto regarded by the best practical experts as the important features to be observed in connection with the use of Bordeaux Mixture as a spray fluid; and it is interesting to find how completely such views derived from practical experience are now justified by theoretical considerations.

Pruning Experiments.

The pruning experiments on apple and pear trees referred to in the Report for 1909 are being continued. On account of the failure of the crop this season there is nothing to add to the remarks made on that occasion, the crop yield not only being very small, but also so irregularly distributed, that no conclusions of any value could be drawn.

The experiments on "light" and "hard" pruning of gooseberry bushes, also described in that Report, have now had to be brought to a conclusion on account of overcrowding by the apple and pear bushes among which they were interplanted. Fortunately the 1910 crop yield was fair, so that the total results cover a period of three years. The appended table gives the yield of each variety under the two systems for each of those seasons.

Name of Variety.	Year.	Yield in lbs. from "light" pruned bushes.	Yield in lbs. from "hard" pruned bushes.
Crown Bob	1908	28½	21¾
Do.	1909(*a*)	116½	100¼
Do.	,, (*b*)	178¼	116
Do.	1910(*a*)	18	15
Do.	,, (*b*)	42½	29
Keepsake	1908	72	105¼
Do.	1909(*a*)	179	103½
Do.	,, (*b*)	202¾	249½
Do.	1910(*a*)	78	4¾
Do.	,, (*b*)	137¾	197½
Lancashire Lad	1908	90¼	101½
Do.	1909(*a*)	57½	76½
Do.	,, (*b*)	102¾	105¼
Do.	1910(*a*)	123¼	32
Do.	,, (*b*)	90½	88
Whinham's Industry	1908	97	85½
Do.	1909(*a*)	176	134
Do.	,, (*b*)	230½	205
Do.	1910(*a*)	95	—
Do.	,, (*b*)	279½	218
Total yield for 1908-10 ..		2395½	1988

(*a*) Picked green. (*b*) Picked ripe.

For the first two years Crown Bob and Whinham's Industry showed fairly large gains in favour of the "light" system, while

Lancashire Lad gave a slight gain in the opposite direction. The results for Keepsake were practically equal. The third year's results gave a decided gain in each instance except Keepsake in favour of the "light" system, the variety named giving a slight gain only. The total results for the three years indicate a gain of about 20 per cent. on the side of the "light" pruning; and it is evident that superior cropping qualities must be attributed to the latter method as well as the advantages of larger and better berries and of greater ease in gathering, mentioned in last season's Report. Unless considerations of space necessitate the restriction in size of the bushes, the "light" system of pruning is undoubtedly to be preferred.

APPENDIX A.—Analyses of Apples and Pears, 1910–11.

Name of Variety.	Specific Gravity of Juice.	Percentage Composition of Juice.			Rate of Fermentation.	Grower.	District.
		Total Sugar. Approximate.	Malic Acid.	Tannin.			
APPLES.							
ALLINGTON PIPPIN ..	1·055	11·25—13·25	1·06	·108	—	Cider Institute ..	Long Ashton S.
ARGILE GRISE	1·056	11·5 —13·5	·31	·536	—	J. Davies ..	Marden H.
ASHTON BROWN JERSEY ..	1·057	11·75—13·75	·19	·194	5·7	Cider Institute ..	Long Ashton S.
ASHTON EARLY RED JERSEY	1·047	9·75—11·75	·17	·480	3·3	Ditto	Ditto
ASHTON FOXWHELP	1·053	10·75—12·75	1·28	·376	5·0	Ditto	Ditto
ASHTON No. 13	1·050	10 —12	·93	·060	18·5	Ditto	Ditto
Ditto No. 26	1·057	11·75—13·75	·53	·248	6·3	Ditto	Ditto
Ditto No. 28	1·045	8·75—10·75	·75	·218	8·0	Ditto	Ditto
Ditto No. 32	1·047	9·25—11·25	·29	·148	3·9	Ditto	Ditto
Ditto No. 36	1·049	9·75—11·75	·28	·086	3·3	Ditto	Ditto
Ditto No. 45	1·052	10·5 —12·5	·33	·268	9·3	Ditto	Ditto
Ditto No. 48	1·053	10·75—12·75	1·11	·220	2·9	Ditto	Ditto
Ditto No. 51	1·056	10·5 —13·5	·30	·374	6·6	Ditto	Ditto
Ditto No. 54	1·055	11·25—13·25	·31	·358	6·9	Ditto	Ditto
Ditto No. 57	1·049	7·75—11·75	·79	·348	4·2	Ditto	Ditto
Ditto No. 63	1·053	10·75—12·75	·37	·592	—	Ditto	Ditto
Ditto No. 66	1·060	12·5 —14·5	·28	·376	4·3	Ditto	Ditto
Ditto No. 67	1·051	10·25—12·25	·39	·416	6·7	Ditto	Ditto
Ditto No. 69	1·046	9 —11	·70	·102	5·5	Ditto	Ditto
Ditto No. 70	1·050	10 —12	·70	·154	7·0	Ditto	Ditto
Ditto No. 81	1·060	12·5 —14·5	·28	·350	4·5	Ditto ..	Ditto
Ditto No. 83	1·053	10·75—12·75	·25	·280	4·5	Ditto	Ditto
Ditto No. 85	1·067	14·25—16·25	·29	·456	4·9	Ditto	Ditto
Ditto No. 87	1·049	9·75—11·75	·62	·094	3·3	Ditto	Ditto
Ditto No. 95	1·048	9·5 —11·5	·55	·076	4·9	Ditto	Ditto
Ditto No. 98	1·053	10·75—12·75	1·08	·270	5·3	Ditto	Ditto
Ditto No. 100	1·055	11·25—13·25	·23	·306	7·8	Ditto	Ditto

ASHTON No. 101	1·049	9·75—11·75	1·22	·324	5·4	Cider Institute ..	Long Ashton
Ditto No. 102	1·053	10·75—12·75	·19	·302	3·2	Ditto	Ditto
Ditto No. 107	1·056	11·5 —13·5	·23	·320	7·2	Ditto	Ditto
Ditto No. 117	1·069	14·75—16·75	·63	·190	4·3	Ditto	Ditto
Ditto No. 120	1·050	10 —12	·24	·288	3·7	Ditto	Ditto
Ditto No. 122	1·058	12 —14	·24	·158	6·4	Ditto	Ditto
Ditto No. 126	1·050	10 —12	·39	·254	6·0	Ditto	Ditto
Ditto No. 130	1·049	9·75—11·75	·47	·104	7·2	Ditto	Ditto
Ditto No. 131	1·056	11·5 —13·5	·23	·316	5·0	Ditto	Ditto
Ditto No. 134	1·056	11·5 —13·5	·24	·266	6·0	Ditto	Ditto
Ditto No. 137	1·056	11·5 —13·5	·26	·460	5·7	Ditto	Ditto
Ditto No. 138	1·057	11·75—13·75	·45	·620	5·7	Ditto	Ditto
Ditto No. 145	1·044	8·5 —10·5	1·18	·308	5·4	Ditto	Ditto
Ditto No. 172	1·055	11·25—13·25	·73	·170	9·4	Ditto	Ditto
Ditto No. 175	1·061	12·75—14·75	·94	·126	7·8	Ditto	Ditto
Ditto No. 177	1·055	11·25—13·25	·48	·154	6·3	Ditto	Ditto
Ditto No. 187	1·051	10·25—12·25	·60	·184	—	Ditto	Ditto
Ditto No. 188	1·059	12·25—14·25	·87	·154	7·3	Ditto	Ditto
Ditto No. 190	1·055	11·25—13·25	·46	·234	—	Ditto	Ditto
Ditto No. 191	1·059	12·25 14·25	·47	·164	3·4	Ditto	Ditto
Ditto No. 196	1·051	10·25—12·25	·22	·268	3·0	Ditto	Ditto
Ditto No. 197	1·076	16·5 —18·5	1·08	·190	7·3	Ditto	Ditto
ASHTON WHITE	1·048	9·5 —11·5	·22	·320	2·6	Ditto	Ditto
BASTARD FOXWHELP ..	1·063	13·25- 15·25	·72	·360	—	J. Davies	Marden H.
BELL	1·056	11·5 – 13·5	·80	·216	—	H. Whiteway ..	Whimple D.
BEAUTY OF DEVON	1·064	13·5 —15·5	·56	·314	—	T. B. Richards ..	Huxham S.
BITTER JERSEY	1·054	11 —13	·74	·310	—	Ditto	Ditto
BLACK FOXWHELP	1·058	12 —14	·65	·282	—	J. Davies	Marden H.
BLACK HEREFORD	1·065	13·75—15·75	·22	·314	—	Ditto	Ditto
BLACKTHORN NORMAN ..	1·049	9·75—11·75	·54	·274	—	Ditto	Ditto
BRAMLEY'S SEEDLING ..	1·046	9 —11	1·31	·154	8·4	Cider Institute ..	Long Ashton S.
BRAMTOT	1·051	10·25—12·25	·58	·236	–	Ditto	Ditto
BRAN ROSE	1·045	8·75—10·75	·43	·086	—	J. Davies	Marden H.
BROADLEAF	1·060	12·5 – 14·5	·42	·370	—	T. B. Richards ..	Huxham S.
BROADLEAF HEREFORD ..	1·048	9·5 —11·5	·20	·226	—	T. Davies	Marden H.
BROWN JERSEY	1·058	12 —14	·35	·262	—	T. B. Richards ..	Huxham S.

Name of Variety.	Specific Gravity of Juice.	Percentage Composition of Juice.			Rate of Fermentation.	Grower.	District.	
		Total Sugar. Approximate.	Malic Acid.	Tannin.				
APPLES—*continued.*								
BROWN SNOUT	1·051	10·25—12·25	·33	·324	4·5	C. Child	Nurnington	H.
BULL'S EYE	1·055	11·25—13·25	·52	·100	—	J. Davies	Marden	H.
BURSTON'S CRAB	1·050	10 —12	1·45	·28	5·7	F. W. Burston ..	Bridgwater	S.
BURSTON'S No. 1	1·053	10·75—12·75	·68	·274	4·6	Ditto	Ditto	
BUTLEIGH No. 14	1·077	16·75—18·75	·16	·168	4·7	R. Neville-Grenville	Butleigh	S.
BUTLER'S No. 2..	1·040	7·5 — 9·5	1·31	·222	—	W. Butler	Long Ashton	S.
Ditto No. 7	1·054	11 —13	·87	·264	—	Ditto	Ditto	
CANON BITTERSWEET ..	1·072	15·5 —17·5	·36	·268	—	J. Davies	Marden	H.
CAP OF LIBERTY	1·057	11·75—13·75	·94	·196	—	H. J. Davis ..	Sutton Montis	S.
Ditto	1·061	12·75—14·75	1·02	·314	—	T. B. Richards ..	Huxham	S.
CAPTAIN KERNEL	1·058	12 —14	·95	·190	—	H. Knight	Huntley	G.
CHERRY HEREFORD ..	1·055	11·25—13·25	·18	·302	—	J. Davies ..	Marden	H.
CHERRY PEARMAIN	1·060	12·5 —14·5	·41	·212	—	Ditto	Ditto	
CHILD'S No. 1	1·061	12·75—14·75	·54	·278	7·4	G. Child	Wraxall	S.
CHISEL JERSEY	1·062	13 —15	·30	·540	—	J. Davies	Marden	
Ditto	1·059	12·25—14·25	·22	·480	5·6	T. B. Richards ..	Huxham	S.
Ditto	1·074	16 —18	·24	·264	—	R. Neville-Grenville	Butleigh	S.
Ditto	1·065	13·75—15·75	·32	·760	5·2	C. Porter	East Lambrook	S.
CIDER LADY'S FINGER ..	1·053	10·75—12·75	·72	·176	—	J. Pearce	Barrow Gurney	S.
COCCAGEE	1·056	11·5 —13·5	·74	·086	—	J. Davies	Marden	H.
COWARNE RED	1·055	11·25—13·25	·74	·226	—	Ditto	Ditto	
Ditto	1·057	11·75—13·75	·73	·218	—	H. Knight	Huntley	G.
COX'S ORANGE PIPPIN ..	1·055	11·25—13·25	·92	·110	—	Cider Institute ..	Long Ashton	S.
CUMMY NORMAN	1·057	11·75—13·75	·29	·170	—	J. Davies	Marden	H.
Ditto	1·053	10·75—12·75	·19	·286	7·5	H. P. Bulmer ..	Hereford	H.
DABINETT..	1·060	12·5 —14·5	·24	·216	15.3	R. Neville-Grenville	Butleigh	S.
Ditto	1·055	11·25—13·25	·19	·242	8·0	Cider Institute ..	Long Ashton	S.
DAVIES' BITTERSWEET ..	1·058	12 —14	·42	·232	—	J. Davies	Marden	H.

DAVIS' FAVOURITE	1·058	12 —14	·37	·228	—	Cider Institute	Long Ashton	S.
Ditto	1·060	12·5 —14·5	·37	·224	—	H. J. Davis	Sutton Montis	S.
DEVON CRAB	1·056	11·5 —13·5	·84	·376	—	T. B. Richards	Huxham	S.
DOUX AMER	1·056	11·5 —13·5	·46	·138	—	R. Neville-Grenville	Butleigh	S.
DOVE	1·061	12·75—14·75	·21	·224	—	H. J. Davis	Sutton Montis	S.
Ditto	1·048	9·5 —11·5	·31	·112	—	T. B. Richards	Huxham	S.
DOVE SEEDLING	1·047	9·25—11·25	·18	·132	—	H. J. Davis	Sutton Montis	S.
DUFFLIN	1·074	16 —18	1·20	·208	2·7	J. C. Daubuz	Truro	C.
DYMOCK RED	1·050	10 —12	·55	·204	3·2	W. Wallis	Tewkesbury	G.
EAVES' No. 1	1·052	10·5 —12·5	·76	·216	—	T. B. Richards	Huxham	S.
Ditto No. 3	1·059	12·25—14·25	·38	·358	-	Ditto	Ditto	
Ditto No. 6	1·048	9·5 —11·5	·83	·190	-	Ditto	Ditto	
FAIR MAID OF DEVON	1·050	10 12	·70	·214	3·9	H. Whiteway	Whimple	D.
FILLBARREL	1·057	11·75—13·75	·55	·224	—	H. J. Davis	Sutton Montis	S.
FLAT JERSEY	1·062	13 —15	·80	·364	-	T. B. Richards	Huxham	S.
FOREST STYRE	1·060	12·5 —14·5	1·01	·164	3·6	T. Garland	Aylburton	G.
FOXWHELP	1·060	12·5 —14·5	·87	·344	—	G. Child	Wraxall	S.
Ditto	1·051	10·25—12·25	·54	·134	—	H. Knight	Huntley	G.
Ditto	1·053	10·75—12·75	·50	·188	—	J. C. Daubuz	Truro	C.
FREQUIN AUDIEVRE	1·057	11·75—13·75	·17	·332	4·2	Ditto	Ditto	
Ditto (Spurious)	1·050	10 —12	·18	·420	2·7	Ditto	Ditto	
GASCOYNE'S SCARLET SEEDLING	1·055	11·25—13·25	·50	·168	—	Cider Institute	Long Ashton	S.
GATCOMBE	1·055	11·25—13·25	·54	·144	3·0	W. Butler	Long Ashton	S.
GATE	1·066	14 —16	·90	·114	—	T. B. Richards	Huxham	S.
GEORGE'S BITTER	1·052	10·5 —12·5	·23	·186	—	Ditto	Ditto	S.
GIBBONS' No. 1	1·041	7·75— 9·75	1·72	·376	8·5	H. Gibbons	Clutton	
Ditto No. 2	1·048	9·5 —11·5	1·21	·188	9·0	Ditto	Ditto	
Ditto No. 3	1·051	10·25—12·25	·96	·230	—	Ditto	Ditto	
GLORY OF THE WEST	1·055	11·25—13·25	·76	·146	—	H. J. Davis	Sutton Montis	S.
GRANVILLE JERSEY	1·057	11·75—13·75	·23	·440	4·6	F. W. Burston	Bridgwater	S.
GREASY PIPPIN	1·053	10·75—12·75	1·08	·250	3·9	T. A. May	Staplegrove	S.
GREENING No. 1	1·053	10·75—12·75	·21	·288	—	T. B. Richards	Huxham	S.
Ditto No. 2	1·053	10·75—12·75	1·35	·270	—	Ditto	Ditto	
GREEN JERSEY	1·061	12·75—14·75	·39	·432	—	Ditto	Ditto	
GREEN WILDING	1·054	11 —13	·18	·210	—	J. Davies	Marden	H.

Name of Variety.	Specific Gravity of Juice.	Percentage Composition of Juice.			Rate of Fermentation.	Grower.	District.	
		Total Sugar. Approximate.	Malic Acid.	Tannin.				
APPLES—*continued.*								
GUTTER	1·052	10·5 —12·5	1·28	·342	5·7			
HALL DOOR	1·058	12 —14	·84	·232	—	J. Davies ..	Marden	H.
HANCOCK'S No. 1	1·054	11 —13	·20	·222	10.0	H. C. Hancock ..	Milverton	S.
Ditto No. 2	1·051	10·25—12·25	·16	·128	—	Ditto	Ditto	
HANDSOME HEREFORD ..	1·050	10 —12	·25	·270	—	J. Davies	Marden	H.
HARDING'S No. 2	1·060	12·5 —14·5	·39	·366	—	R. Harding ..	Long Ashton	S.
Ditto No. 3	1.050	10 —12	·61	·228	—	Ditto	Ditto	
Ditto No. 6	1·044	8·5 —10·5	·87	·234	1·9	Ditto	Ditto	
Ditto No. 7	1·046	9 —11	·91	·284	—	Ditto	Ditto	
Ditto No. 8	1·047	9·25—11·25	·27	·212	—	Ditto	Ditto	
Ditto No. 11	1·051	10·25—12·25	·71	·216	—	Ditto	Ditto	
HARRY MASTERS	1·060	12·5 —14·5	·28	·294	—	H. J. Davis.. ..	Sutton Montis	S.
Ditto	1·057	11·75—13·75	·38	·284	—	T. B. Richards ..	Huxham	S.
HOBBS' JERSEY	1·059	12·25—14·25	·43	·228	—	H. J. Davis ..	Sutton Montis	S.
HOLMAN'S No. 23	1·058	12 —14	·19	·158	9·2	R. Neville-Grenville	Butleigh	S.
Ditto No. 66	1·053	10·75—12·75	·20	·186	6·8	Ditto	Ditto	
HORNER	1·065	13·75—15·75	·22	·304	—	H. J. Davis ..	Sutton Montis	S.
Ditto	1·062	13 —15	·21	·222	7·6	T. B. Richards ..	Huxham	S.
Ditto	1·059	12·25—14·25	·36	·228	4·0	W. Hicks	Brean	S.
Ditto	1·052	10·5 —12·5	·25	·162	3·4	R. Neville-Grenville	Butleigh	S.
IMPROVED BROADLEAF ..	1·045	8·75—10·75	·26	·446	4·7	C. Porter	East Lambrook	S.
JONES SEEDLING	1·043	8·25—10·25	·92	·154	—	Cider Institute ..	Long Ashton	S.
KING OF THE PIPPINS ..	1·055	11·25—13·25	·78	·098	13·5	Ditto	Ditto	
KING'S GLORY	1·055	11·25—13·25	·21	·450	—	T. B. Richards ..	Huxham	S.
KINGSTON BLACK	1·065	13·75—15·75	·65	·204	2·6	S. Cecil	White Lackington	S.
Ditto	1·058	12 —14	·67	·186	—	Cider Institute ..	Long Ashton	S.
Ditto	1·061	12·75—14·75	·71	·178	4·6	F. Ford	Hereford	H.

KINGTSON BLACK	1·063	13·25- 15·25	·74	·184	3·9	Ditto	Ditto	
Ditto	1·062	13 —15	·72	·188	4·2	Ditto	Ditto	
Ditto	1·051	10·25—12·25	·60	·168	3·5	Ditto	Ditto	
Ditto	1·062	13 - 15	·63	·168	3·4	T. A. May ..	Staplegrove	S. S.
Ditto	1·066	14 - 16	·60	·142	4·2	J. H. Horsey ..	Bridgwater	S. S.
Ditto	1·071	15·25- 17·25	·62	·178	5·0	J. Jeanes	North Petherson	S. S.
Ditto	1·057	11·75—13·75	·56	·134	5·6	R. Adams	West Town	S. S.
Ditto	1·057	11·75- 13·75	·55	·120	—	H. Whiteway ..	Whimple	D.
Ditto	1·057	11·75- 13·75	·52	·096	4·8	R. Neville-Grenville	Butleigh	S. S.
Ditto	1·060	12·5 —14·5	·56	·100	—	H. Knight	Huntley	G.
Ditto	1·065	13·75 15·75	.57	·118	-	J. Davies	Mardon	H.
Ditto	1·072	15·5 - 17·5	·69	·170		H. J. Davis ..	Sutton Montis	S. S.
Ditto	1·075	16·25—18·25	·64	·220	-	T. B. Richards ..	Huxham	S.
Ditto	1·059	12·25 - 14·25	·32	·480	3·0	C. Daubuz ..	Truro	C.
KNOTTED HEREFORD ..	1·055	11·25- 13·25	·30	·456	-	J. Davies	Marden	H.
LADY'S FINGER	1·046	9 11	·58	·096	7·2	Cider Institute ..	Long Ashton	S.
Ditto	1·060	12·25—14·25	·67	·134	8·6	Ditto	Ditto	
Ditto Tree C.	1·055	11·25—13·25	·60	·132	8·4	Ditto	Ditto	
Ditto Tree 113	1·043	8·25—10·25	·60	·082	8·8	Ditto ..	Ditto	
Ditto Tree 92	1·048	9.5 —11·5	·72	·126	7·3	Ditto	Ditto	
Ditto Tree 127	1·050	10 —12	·63	·086	9·8	Ditto	Ditto	
Ditto Tree 119	1·051	10·25 -12·25	·58	·100	7·4	Ditto ..	Ditto	
LAMBROOK PIPPIN	1·053	10·75- 12·75	·65	·248	2·8	J. H. Symes ..	Martock	S. S.
LANE'S PRINCE ALBERT ..	1·048	9·5 - 11·5	1·19	·126	12·0	Cider Institute ..	Long Ashton	S. S.
LATE BLOWER	1·055	11·25- 13·25	·53	·168	-	H. Whiteway ..	Whimple	D.
LATE JERSEY	1·061	12·75 14·75	·25	·316	—	T. B. Richards ..	Huxham	S.
LOYAL DRANG	1·059	12·25—14·25	·28	·574	—	Ditto	Ditto	
MAGGS' SEEDLING	1·052	10·5 - 12·5	·80	·188	-	Cider Institute ..	Long Ashton	S. S.
MEDAILLE D'OR	1·055	11·25- 13·25	·46	·386		H. J. Davis ..	Sutton Montis	S. S.
Ditto	1·057	11·75- 13·75	·34	·610	-	J. Davies	Marden	H.
Ditto	1·058	12 14	·24	·200	—	H. Whiteway	Whimple	D.
Ditto	1·062	13 —15	·28	·430	—	T. B. Richards ..	Huxham	S.
Ditto	1·085	18·75- 20·75	·32	·920	—	R. Neville-Grenville	Butleigh	S. S.
Ditto	1·058	12 - 14	·23	1·080	—	J. C. Daubuz ..	Truro	C.
MORGAN SWEET	1·046	9 —11	·23	·160	9·9	Cider Institute ..	Long Ashton	S.
Ditto (Spurious)	1·059	12·25—14·25	·47	·290	—	H. Knight	Huntley	G.

Name of Variety.	Specific Gravity of Juice.	Percentage Composition of Juice.			Rate of Fermentation.	Grower.	District.
		Total Sugar. Approximate.	Malic Acid.	Tannin.			
APPLES—*continued*							
NAISH'S BITTER	1·060	12·5 —14·5	·25	·510	—	T. B. Richards ..	Huxham S.
NEVERBLIGHT	1·056	11·5 —13·5	·68	·240	—	Ditto	Ditto
NEW CADBURY	1·051	10·25—12·25	·21	·104	6·2	R. Neville-Grenville	Butleigh S.
NEW FOXWHELP	1·060	12·5 —14·5	·73	·190	—	J. Davies	Marden H.
NEW JERSEY	1·062	13 —15	·51	·122	—	T. B. Richards ..	Huxham S.
NEWTON RED JERSEY ..	1·058	12 —14	·36	·450	3·5	A. E. Ellis ..	Newton S. Cyres D.
NEWTON WONDER	1·045	8·75—10·75	·67	·124	15·0	Cider Institute ..	Long Ashton S.
NORTON BITTER	1·061	12·75—14·75	·33	·364	5·5	C. Porter	East Lambrook S.
OLD FOXWHELP	1·056	11·5 —13·5	·99	·234	—	J. Davies	Marden H.
Ditto	1·062	13 —15	·61	·368	—	H. J. Davis ..	Sutton Montis S.
PAGE'S YELLOW	1·053	10·75—12·75	·65	·134	4·0	T. Garland ..	Aylburton G.
PARFITT'S WONDER	1·063	13·25—15·25	·34	·214	—	H. J. Davies ..	Sutton Montis S.
PEARCE'S No. 1	1·052	10·5 —12·5	·35	·182	13·0	J. Pearce	Barrow Gurney S.
PHILIP NORMAN	1·050	10 —12	·26	·318	—	Cider Institute ..	Long Ashton S.
PORT WINE	1·065	13·75—15·75	·57	·232	—	H. J. Davis ..	Sutton Montis S.
PRIDEAUX No. 1.	1·054	11 —13	·21	·194	—	J. Prideaux ..	Wraxall S.
RED BUTCHER. Tree A. ..	1·066	14 —16	1·39	1·92	3·8	Cider Institute ..	Long Ashton S.
Ditto Tree B.	1·068	14·5 —16·5	1·52	1·66	3·9	Ditto	Ditto
RED FOXWHELP	1·053	10·75— 12·75	·89	·134	—	J. Davies	Marden H.
RED HEREFORD	1·060	12·5 —14·5	·21	·304	—	J. Davies	Marden H.
RED JERSEY	1·060	12·5 —14·5	·26	·498	5·1	Mrs. Goodson ..	Burrowbridge S.
RED ROYAL	1·057	11·75—13·75	·44	·062	—	H. Knight	Huntley G.
RED STYRE	1·057	11·75—13·75	·65	·144	—	Ditto	Ditto
RED TURK	1·057	11·75—13·75	·74	·256	—	J. Davies	Marden H.
RED WILDING	1·054	11 —13	·30	·524	—	J. Davies ..	Marden H.
REDSTREAK (Somerset) ..	1·040	7·5 — 9·5	·12	·134	—	H. J. Davis ..	Sutton Montis S.
REINETTE OBRY	1·062	13 —15	·68	·242	—	R. Neville-Grenville	Butleigh S.

RICHARDS' BITTERSWEET ..	1·049	9·75—11·75	·17	·228	—	T. B. Richards ..	Huxham	S.
RICHARDS' SEEDLING ..	1·061	12·75—14·75	·23	·286	—	Ditto ..	Ditto	
ROUGE BRUYERE	1·052	10·5 — 12·5	·76	·178	—	J. Davies ..	Marden	H.
ROUND CLUSTER	1·057	11·75—13·75	·22	·196	6·6	F. W. Burston ..	Bridgwater	S.
ROUND JERSEY	1·071	15·25—17·25	·51	·532	—	T. B. Richards ..	Huxham	S.
ROYAL JERSEY	1·058	12 —14	·20	·440	3·1	J. H. Symes ..	Martock	S.
Ditto	1·057	11·75—13·75	·22	·338	—	T. B. Richards ..	Huxham	S.
Ditto	1·061	12·75—14·75	·18	·348	—	H. J. Davis ..	Sutton Montis	S.
Ditto	1·043	8·25—10·25	·36	·226	—	Cider Institute ..	Long Ashton	S.
ROYAL WILDING	1·060	12·5 —14·5	·45	·272	—	H. Knight	Huntley	G.
Ditto	1·062	13 —15	·19	·242	—	J. Davies	Marden	H.
Ditto	1·053	10·75—12·75	·53	·054	—	H. Whiteway ..	Whimple	D.
RUSSET JERSEY	1·066	14 —16	·26	·476	8·0	Cider Institute ..	Long Ashton	S.
SAM'S CRAB	1·060	12·5 —14·5	·36	·176	—	J. Davies	Marden	H.
SARGEANT	1·060	12·5 —14·5	·41	·376	—	H. J. Davis ..	Sutton Montis	S.
SHARP'S MIDSUMMER ..	1·062	13 —15	·72	·110	—	Cider Institute ..	Long Ashton	S.
SILVER CUP	1·044	8·5 10·5	·11	·208	—	T. B. Richards ..	Huxham	S.
Ditto	1·056	11·5 —13·5	·33	·200	—	H. J. Davis ..	Sutton Montis	S.
SKYRME'S KERNEL	1·065	13·75—15·75	·70	·244	—	J. Davies ..	Marden	H.
Ditto	1·063	13·25 15·75	·76	·186	—	H. Knight	Huntley	G.
SNOW'S APPLE	1·045	8·75—10·75	·98	·300	—	H. Whiteway ..	Whimple	D.
SOUTH QUEENING	1·058	12 —14	·45	·430	—	J. Davies	Marden	H.
SPREADING REDSTREAK ..	1·055	11·25—13·25	·62	·142	—	J. Davies	Marden	H.
STABLE JERSEY	1·060	12·5 —14.5	·39	·286	—	T. B. Richards ..	Huxham	S.
STEAD'S KERNEL	1·065	13·75—15·75	·41	·226	—	J. Davies	Marden	H.
STRAWBERRY NORMAN ..	1·056	11·5 — 13·5	·60	·364	—	Ditto	Ditto	
Ditto	1·053	10·75—12·75	·27	·436	5·1	H. P. Bulmer ..	Hereford	H.
STYRE	1·054	11 —13	·96	·142	—	J. Davies ..	Marden	H.
SUGARLOAF	1·054	11 —13	·32	·088	—	H. Whiteway ..	Whimple	D.
SWEET ALFORD	1·050	10 —12	·47	·172	—	Ditto	Ditto	
SWEET COPPIN	1·054	11 — 13	·20	·144	—	Ditto	Ditto	
SWEET'S EGG CRAB	1·059	12·25—14·25	·22	·430	—	J. Sweet	Dundry	S.
TAYLOR'S BITTER	1·047	9·25—11·25	·31	·202	5·4	C. Porter	East Lambrook	S.
TIPPLER'S KERNEL	1·052	10·5 —12·5	1·38	·204	—	H. Knight	Huntley	G.
TOM PUTT	1·056	11·5 —13·5	·56	·324	—	H. Whiteway ..	Whimple	D.

Name of Variety.	Specific Gravity of Juice.	Percentage Composition of Juice.			Rate of Fermentation.	Grower.	District.	
		Total Sugar. Approximate.	Malic Acid.	Tannin.				
APPLES—*continued.*								
TOM PUTT	1·052	10·5 —12·5	·81	·152	—	T. B. Richards ..	Huxham	S.
TRACED HEREFORD	1·052	10·5 —12·5	·61	·134	—	H. J. Davis ..	Warden	H.
TREMLITT'S BITTER	1·060	12·5 —14·5	·23	·480	—	H. Whiteway ..	Whimple	D.
UPRIGHT FRENCH	1·052	10·5 —12·5	·30	·460	9·5	H. P. Bulmer ..	Hereford	H.
UPRIGHT REDSTREAK ..	1·041	7·75— 9·75	·62	·174	—	J. Davies	Marden	H.
VOWLES' No. 1	1·055	11·25—13·25	·39	·172	14·0	C. Vowles	Barrow Gurney	S.
Ditto No. 2	1·046	9 —11	·77	·080	6·4	Ditto	Ditto	
WARNER'S KING	1·054	11 —13	·85	·124	12·5	Cider Institute ..	Long Ashton	S.
WHIMPLE FAVOURITE ..	1·049	9·75—1·175	1·14	·098	—	H. Whiteway ..	Whimple	D.
WHIMPLE HONEYDROP ..	1·054	11 —13	·27	·210	—	Ditto	Ditto	
WHIMPLE QUEEN	1·055	11·25—13·25	·21	·138	—	Ditto	Ditto	
WHITE CLOSE PIPPIN ..	1·053	10·75—12·75	·27	·298	—	H. J. Davis ..	Sutton Montis	S.
Ditto	1·050	10 —12	·23	·244	—	T. B. Richards ..	Huxham	S.
Ditto	1·054	11 —13	·20	·320	—	Cider Institute ..	Long Ashton	S.
WHITE JERSEY	1.058	12 —14	·13	·282	—	T. B. Richards ..	Huxham	S.
Ditto	1·051	10·25—12·25	·21	·162	—	H. J. Davis ..	Sutton Montis	S.
WHITE NORMAN	1·064	13·5 —15·5	·16	·720	—	T. B. Richards ..	Huxham	S.
Ditto	1·059	12·25—14·25	·21	·356	—	J. Davies ..	Marden	H.
WINTER BLACK	1·063	13·25—15·25	·89	·330	—	T. B. Richards ..	Huxham	S.
WOODBINE	1·054	11 —13	·22	·144	—	H. Whiteway ..	Whimple	D.
WOODHAYES SOUR	1·047	9·25—11·25	·64	·188	—	Ditto	Ditto	
WYATT'S NATURAL	1·041	7·75— 9·75	·52	·110	—	Ditto	Ditto	
YARLINGTON MILL	1·057	11·75—13·75	·40	·322	—	H. J. Davis ..	Sutton Montis	S.
Ditto	1·043	8·25—10·25	·19	·148	—	Cider Institute ..	Long Ashton	S.
Ditto	1·051	10·25—12·25	·45	·298	—	T. B. Richards ..	Huxham	S.
YELLOW STYRE	1·059	12·25—14·25	·72	·184	6·5	T. Garland ..	Aylburton	G.
YEOVIL SOUR	1·052	10·5 —12·5	·59	·122	—	Cider Institute ..	Long Ashton	S.

PEARS—									
BLAKENEY RED	1·055	11·25	13·25	·29	·050	6·0	H. Knight	Huntley	C.
BUTT	1·050	10	12	·38	·100		Ditto	Ditto	
COPPY	1·047	9·25	11·25	·29	·050	4·0	R. H. Cazalet	Castlemorton	W.
CUMBER	1·045	8·75	10·75	·46	·128		H. Knight	Huntley	C.
NEW MEADOW	1·049	9·75	11·75	·27	·026	3·1	T. J. Hendey	Ledbury	H.
OLDFIELD	1·065	13·75	15·75	·42	·098		H. Knight	Huntley	C.
PAXFORD	1·054	11	13	·65	·110	8·9	J. Mosdley	Wilbarsey	W.
RED HORSE	1·051	10·25	12·25	·51	·088	2·6	R. H. Cazalet	Castlemorton	W.
Ditto	1·047	9·25	11·25	·18	·040	7·1	H. Knight	Huntley	C.
RED LONGDON	1·053	10·75	12·75	·26	·062		Ditto	Ditto	
ROCK	1·070	15	17	·41	·480	3·0	T. J. Hendley	Ledbury	H.
THORN	1·050	10	12	·21	·052	4·0	H. Knight	Huntley	C.
WINNALLS LONGDON	1·048	9·5	11·5	·17	·026		Ditto	Ditto	
YELLOW BUTTCAP	1·056	11·5	13·5	·40	·080	8·5	T. J. Hendley	Ledbury	H.

APPENDIX B.—Returns from Variety Trials of Apples, Pears, Plums, and Small Fruits in Plantations I. and II.

Name of Variety.	Yield in lbs. 1910.	1909.
PLANTATION No. I.		
APPLES (Dessert)—		
Allington Pippin 27 bushes and 3 standards ..	5¼	164¾
Beauty of Bath .. „	—	16¾
Cox's Orange Pippin „	9	65½
Devonshire Quarrenden „	—	32
King of the Pippins „	77	75¼
Worcester Pearmain (Culinary) .. „	73½	33¾
Bramley's Seedling .. „	97¼	38¼
Ecklinville Seedling .. „	24	117
Lane's Prince Albert .. „	193½	128¾
Lord Suffield .. „	16	30¾
Newton Wonder .. „	8	131½
Stirling Castle .. „	110¼	96¾
PEARS—		
Catillac .. .. „	—	4½
Doyenne Boussoch .. „	8	47½
Louise Bonne de Jersey „	—	137¾
Williams' Bon Chretien „	—	28¾

	Yield in lbs. 1910.	1906-9.
GOOSEBERRIES—		
Crown Bob 90 plants	104½	798¾
Keepsake .. „	418	1295½
Lancashire Lad .. „	333¾	724½
Whinam's Industry „	592½	1131
RASPBERRIES—		
Hornet .. 180 plants	139	630¾
Northumberland Fillbasket „	160¼	736¾
Norwich Wonder .. „	101	609¾
Superlative .. „	171½	579¾
RED CURRANTS—		
Fay's Prolific .. 90 plants	117¾	525¼
Knight's Sweet Red „	131¾	441
Raby Castle .. „	233¾	727¼
WHITE CURRANTS—		
White Dutch .. 90 plants	31½	895

APPENDIX B—*continued.*

Name of Variety.	Yield in lbs. 1910.	1909.
PLANTATION No. II.		
APPLES—		
Bismarck .. 7 bushes and 3 standards ..	14	118¼
American Mother .. „	—	4¾
King's Acre Pippin .. „	—	21
Lady Sudeley .. „	—	8¾
Lord Grosvenor .. „	23¼	61¾
Warner's King .. „	3	30¼
White Transparent .. „	3¾	5
Court Pendu Plat 10 bushes	3¼	2¼
Frogmore Prolific .. „	10½	43¼
James Grieve .. „	—	14
Lord Derby .. „	27½	52¾
Peasgood's Nonsuch .. „	—	5¾
Potts' Seedling .. „	—	5¾
Rival .. .. „	—	31¼
Sturmer Pippin .. „	19½	40
Wealthy .. .. „	—	16½
PEARS—		
Conference .. 7 bushes and 3 standards ..	—	19½
Dr. Jules Guyot .. „	—	12¾
Hessle .. .. „	—	28½
Pitmaston Duchess .. „	—	3
Bellissime d'Hiver 10 bushes	—	6¾
Durondeau .. .. „	—	½
Emile d'Heyst .. „	—	16
PLUMS—		
Denniston's Superb 7 bushes and 3 standards ..	—	6½
Pond's Seedling .. „	—	6¾
Transparent Gage .. „	—	6
Monarch .. 10 bushes	—	4½
Heron .. .. „	—	1
Early Rivers .. „	—	5
Czar .. .. „	—	5
STRAWBERRIES—		
Royal Sovereign 200 4-year-old-plants ..	35	180
Auguste Nicaise 100 3-year-old plants ..	5	25¾
Dr. Hogg .. „	6	16
Elton Pine .. „	4	51
Givon's Latè Prolific „	12	53¼
Keen's Seedling .. „	4¾	14¼
Leader .. .. „	9¼	69½
President Loubet .. „	4	10
Queen of Denmark .. „	8	34
Scarlet Queen .. „	4	13

APPENDIX B—*continued.*

Name of Variety.	Yield in lbs. 1910.	1909.
PLANTATION No. II.—*continued.*		
STRAWBERRIES—		
Stirling Castle 100 3-year-old plants ..	32	63
Trafalgar .. .. ,, ...	5¾	27
British Queen 70 3-year-old plants ..	4	15
La Grosse Sucree .. ,, ...	10½	8
Louis Gauthier .. ,, ...	18½	7
Sir C. Napier .. ,, ...	6	33
St. Joseph .. .. ,, ...	4	3¼
BLACK CURRANTS—		
Boskoop Giant 30 plants	56¼	16
Black Prince .. .. ,, ...	15¾	19
Goliath .. .. .. ,, ...	18	11
Ogden's Black .. .. ,, ...	30½	36½
Victoria .. .. .. ,, ...	21½	16
RED CURRANTS—		
Cherry .. 30 plants	3¾	10
Comet .. .. .. ,, ...	5¼	14
La Fertile .. .. .. ,, ...	8½	12
La Hative .. .. .. ,, ...	4½	9
La Versaillaise .. .. ,, ...	8	15
New Red Dutch .. .. ,, ...	22	39
Red American .. .. ,, ...	8½	7
Red Grape .. .. ,, ...	2¼	10
Moore's Seedling .. .. ,, ...	8	—
WHITE CURRANTS—		
La Transparent 30 plants	8¼	35
White Dutch Cut Leaf ,, ...	5	36
White Transparent ,, ...	10	27
White Versailles .. .. ,, ...	14	24

	Yield in lbs. 1910.	1907-9.
RASPBERRIES—		
Abundance 150 plants	51¾	128¼
Baumforth's Seedling ,, ...	40½	201¼
Carter's Prolific .. ,, ...	36¾	129¾
Red Antwerp .. ,, ...	67¼	227½
Semper Fidelis (*a*) .. ,, ...	69½	210¼
,, ,, (*b*) .. ,, ...	51½	94
Lord Beaconsfield .. ,, ...	73	195¾

APPENDIX B—*continued.*

Name of Variety.	Yield in lbs. 1910.	1907-9.
PLANTATION No. II.—*continued.*		
GOOSEBERRIES—		
Blucher .. 20 bushes	9	24¼
Careless .. .. ,, ...	86	97¼
Early Sulphur	11	38¼
Faithful	53½	88¾
Falstaff	21½	62¾
Fascination	72	96½
King of Trumps	153¼	163½
Leader..	76¾	58
Leveller	61½	110½
May Duke .. .. ,, ...	14	94½
Mount Pleasant .. ,, ...	45½	47
Red Warrington	24½	87½
Surprise .. .. ,, ...	66½	108¾
Telegraph .. .. ,, ...	127½	93
Golden Gem 10 bushes	10¼	21¾
Gretna Green .. ,, ...	31¾	42½
Dan's Mistake	10	11
Diadem .. .. ,, ...	69½	34¼
High Sheriff	30½	15½
Hero of the Nile	5½	12¾
Langley Gage	60½	71
Ringer	14	14½
Thatcher	20	29¾
Victoria	31	40
Red Champagne	14	29¼
Transparent	63¾	25½

APPENDIX C.

The Date of Blossoming of Varieties of Apples, Pears, Plums, and Small Fruits.

Variety.	Date of Flowering.		
	1910	1909	1908
APPLES			
Market Varieties:—			
Siberian Crab	Ap. 24		
Keswick Codlin	,, 29		
Stirling Castle	,, 29	May 6	May 5
Lord Suffield	,, 29	,, 9	,, 10
Warner's King	,, 30	,, 5	
Wealthy	May 1	,, 9	,, 12
Devonshire Quarrenden	,, 1	,, 6	,, 5
Bismarck	,, 2	,, 7	
White Transparent	,, 2	,, 7	,, 11
Peasgood's Nonsuch	,, 3	,, 10	
Lord Grosvenor	,, 4	,, 9	
Worcester Pearmain	,, 4	,, 7	,, 11
Ecklinville	,, 4	,, 7	,, 11
Beauty of Bath	,, 4	,, 7	,, 6
Sturmer Pippin	,, 4	,, 5	,, 9
Potts' Seedling	,, 5	,, 10	
James Grieve	,, 6	,, 5	,, 13
Lord Hindlip	,, 7	,, 8	
Charles Ross	,, 7	,, 7	
Rival	,, 7	,, 11	
King's Acre Pippin	,, 8	,, 7	
Dartmouth Crab	,, 8		
King of the Pippins	,, 8	,, 6	,, 12
Lane's Prince Albert	May 8	May 11	May 11
Frogmore Prolific	,, 8	,, 9	
Cox's Orange Pippin	,, 9	,, 9	,, 11
Bramley's Seedling	,, 10	,, 5	,, 11
Gascoigne's Scarlet Seedling	,, 12	,, 11	
Lord Derby	,, 12	,, 10	
Allington Pippin	,, 12	,, 7	
Blenheim Orange	,, 12	,, 7	
Houblon	,, 13	,, 8	
Newton Wonder	,, 14	,, 9	
Wellington	,, 14	,, 10	
Golden Noble	,, 17	,, 14	
Lady Sudeley	,, 18	,, 9	,, 14
Royal Jubilee	,, 18	,, 14	,, 27
Coronation	,, 19	,, 14	
American Mother	,, 21	,, 9	
Court Pendu Plat	,, 24	,, 14	
Vintage Varieties:—			
M. Jacques	May 2	May 8	May 11
Jarrow Bank	,, 3	,, 9	
Frequin Rouge	,, 4	,, 8	,, 11
M. Jacques (Free stock)	,, 5	,, 10	
Knotted Kernel (Free stock)	,, 5	,, 13	

APPLES—*continued*

Eggleton Styre (Free stock)	May 5	May 11	
Court Royal (Free stock) ..	,, 6	,, 11	
Ecarlatine (Free stock) ..	,, 9	,, 12	
Cap of Liberty (Free stock ..	,, 9	,, 11	
Chisel Jersey (Free stock) ..	,, 9	,, 11	
Foxwhelp (Free stock) ..	,, 9		
Stuart's Seedling (Free stock)	,, 9		
Cherry Pearmain	,, 10	,, 9	May 21
Cherry Pearman (Free stock)	,, 11		
Cremiere (Free stock) ..	,, 12	,, 12	
Kingston Black (Free stock)	,, 12	,, 13	
Sweet Alford (Free stock) ..	,, 14	,, 19	
Neverblight	,, 14	,, 11	,, 20
Yarlington Mill (Free stock)	,, 14		
Cowarne Red (Free stock) ..	,, 14	,, 17	
Dymock Red	,, 14	,, 9	,, 22
Butleigh No. 14 (Free stock)..	,, 14		
Virgin Mary (Free stock) ..	,, 14		
Black Foxwhelp (Free stock)	,, 14		
Dabinett (Free stock) ..	,, 14	,, 17	
Rouge de Treves (Free stock)	,, 14	,, 22	
Rouge Bruyere (Free stock)	,, 14		
Skyrme's Kernel (Free stock)	,, 15	,, 19	,, 22
Dabinett	,, 15	,, 13	,, 22
Sharpe's Midsummer ..	,, 15	,, 10	
Cowarne Red	,, 16	,, 11	,, 19
Broadleaf Jersey (Free stock)	,, 16	,, 21	
Chevalier	,, 16	,, 17	
Yarlington Mill	,, 17	,, 13	,, 19
Kingston Black Improved ..	,, 17	,, 11	
Redstreak	,, 17	,, 9	,, 19
Northwood	,, 17	,, 11	
Thomas Hunt	,, 17	,, 11	
Doux Amer (Free stock) ..	,, 17	,, 12	
Bedan des Parts (Free stock)	,, 17		

APPLES—*continued*

White Jersey (Free stock) ..	May 17		
Royal Wilding	,, 19	May 13	
Royal Jersey (Free stock) ..	,, 19		
Harry Masters (Free stock) ..	,, 20	,, 22	
White Jersey	,, 20	,, 15	May 22
Major	,, 20	,, 13	
Horners..	,, 20		
Strawberry Norman (Free stk.)	,, 21	,, 19	
Cherry Norman	,, 22	,, 11	,, 22
Cherry Norman (Free stock)	,, 22		
Sharpe's Summer (Free stock)	,, 22		
Medaille d'Or	,, 22	,, 18	,, 31
Royal Jersey	,, 22	,, 11	,, 16
Dove	,, 23	,, 9	
Frequin Audievre (Free stock)	,, 23	,, 22	
Butleigh 14	,, 24		

PEARS:—

Market Varieties:—

Louise Bonne de Jersey ..	Apl. 3	Apl. 20	Apl. 22
Doyenne Boussoch	,, 13	,, 24	,, 28
Beurre d'Amanlis	,, 13	,, 28	May 1
Vicar of Winkfield	,, 13		
Bellissime d'Hiver	,, 13	,, 26	,, 1
Williams' Bon Chretien ..	,, 14	,, 28	Apl. 30
Emile d'Heyst..	,, 15	,, 28	May 1
Conference	,, 15	May 1	,, 1
Pitmaston Duchess	,, 17	,, 3	,, 3
Dr. Jules Guyot	,, 18	,, 3	,, 3
Pitmaston Duchess	,, 21	,, 3	,, 2
Hessle	,, 21	,, 3	
Catillac	,, 22	,, 3	,, 3
Petite Marguerite	,, 23	,, 1	
Durondeau	,, 24	Apl. 26	,, 1
Triomphe de Vienne	,, 25	May 4	

Variety.	Date of Flowering.		
	1910	1909	1908
PEARS—*continued.*			
Vintage Varieties :—			
Barland	Apl. 30		
Taynton Squash	,, 30	Apl. 30	May 3
Oldfield	May 1	May 5	,, 3
Moorcroft	,, 1	Apl. 30	,, 3
Pine	,, 1		
PLUMS :—			
Mallard	Apl. 10	Apl. 17	Apl. 19
Monarch	,, 15	,, 17	,, 30
Heron	,, 15	,, 18	,, 30
Czar	,, 17	,, 23	,, 30
Victoria	,, 19	,, 22	May 1
Purple Prolific	,, 20	,, 23	
Early Transparent Gage ..	,, 20	,, 22	Apl. 30
Early Prolific	,, 20	,, 22	,, 29
Denniston's Superb	,, 20	,, 22	,, 30
President	,, 23	,, 28	May 1
Comte Athens' Gage ..	,, 23	,, 28	
Late Orange	,, 25	,, 19	
Pond's Seedling	,, 27	,, 26	
BLACK CURRANTS :—			
Black Prince	,, 24	,, 27	
Goliath	,, 24	,, 29	
Ogden's Black	,, 24	,, 30	
Boskoop Giant	,, 27	,, 30	
Victoria	,, 28	,, 29	

Variety.	Date of Flowering.		
	1910	1909	1908
RASPBERRIES :—			
Northumberland Fillbasket ..	May 23	May 27	
Baumforth's Seedling ..	,, 24		
Norwich Wonder	,, 24	,, 26	
Lord Beaconsfield	,, 25	,, 26	
Red Antwerp	,, 25	,, 28	
Semper Fidelis	,, 25	,, 28	
Abundance	,, 25	,, 28	
Hornet	,, 25	,, 25	
Superlative	,, 25	,, 26	
The Guinea	,, 26	,, 28	
STRAWBERRIES :—			
Keen's Seedling	May 9	May 11	
Auguste Nicaise	,, 9	,, 11	
St. Antoine de Padoue ..	,, 9	,, 12	
La Grosse Sucree	,, 9	,, 11	
Leader	,, 10	,, 14	
St. Joseph	,, 13	,, 11	
Sir C. Napier	,, 13	,, 11	
Royal Sovereign	,, 14	,, 12	
Dr. Hogg	,, 15	,, 14	
Scarlet Queen	,, 16	,, 13	
Queen of Denmark	,, 16	,, 14	
British Queen	,, 16	,, 17	
Louis Gauthier	,, 18	,, 9	
Stirling Castle	,, 19	,, 10	

APPENDIX D.—Report on the Trial Orchards Planted 1908–10.

The following reports on the trial orchards planted during the last two seasons have been received.

Hereford.—Mr. A. J. Manning, County Horticultural Instructor, reports as follows:—The orchard at Burghill, planted in 1908 is doing, on the whole, extremely well; two trees of Cowarne Red failed to start last spring, and represent all the casualties, but there have been a considerable number of cankers developed on the stems of the trees this past winter, reaching in to three and four layers of growth, leading one to presume that the attack commenced when "feathering" or clearing the stems of superfluous growth took place in the Nursery. A few trees broke away from their ties at the end of the past summer and were slightly damaged, but not seriously; in fact, wounds caused thus, and those made by cutting away cankers will, I think, be quite healed over during the coming summer's growth. The discussion at the Conference, three years ago, *re* pruning at planting time *versus* pruning the following winter will probably be remembered. In this orchard these two methods, together with pruning in early summer, have been tried, and another year I hope to be able to send you photographs and data that will be of interest; the appearance of the trees at present, and their behaviour on last spring's growth, appear to be wholly in favour of pruning the same winter in which they are planted. The trees pruned when planted have made an average of growth quite as great as those pruned the following year, and have made a much larger number of fruit spurs. I think that another year will warrant calling especial attention to the results of the three methods.

With regard to the orchards planted on the three small holdings at Leominster, two have done well, two trees in each case only have died. The others have made quite satisfactory growth. In the other case 15 out of the 50 trees supplied died, owing to the tenant's neglect in allowing the roots of the trees supplied to his holding getting badly frozen before planting. The remainder have made really good growth, and at present promise well for the future.

Gloucester.—Mr. G. H. Hollingworth, County Horticultural Instructor, has supplied the following report.

The following remarks apply to orchards planted in December, 1908:

Berkeley.—The trees in this orchard were allowed to stand for a

year before being pruned, and since the leading growths were shortened back in the spring of 1910, the specimens have mostly made good heads and are doing well. For the purpose of experiment the turf was relaid over the roots of several trees of each variety at the time of planting, and in other cases the turf was cut up and buried under the roots. The experiment has proved to be a very useful object lesson, as the heads of the trees which had the turf laid back over the roots are not half so big, neither are the stems nearly so thick, as the trees which were not treated in this way. Future observations will be made as to the effect of turf on the one hand and the cultivation of the ground 2ft. from the stem on the other. It has not been necessary to replace any tree in this orchard, which is in a very satisfactory condition.

Hardwicke.—Here again the trees were left for a year before being shortened back, and the same experiment in respect of replacing the turf over the roots was conducted with precisely the same results. The difference is so marked and the trees which had the turf put back are so inferior in growth compared to the rest, that I have decided to remove the turf round the trees with the exception of one or two of each variety, which will be left for future comparison. Canker has shown itself in a few places in this orchard, and two specimens have had to be replaced, but on the whole satisfactory progress has been made, and the majority of the trees are becoming well established.

Lydney.—Under the same method of pruning adopted in the foregoing cases the trees in this orchard have mostly made good heads, and are doing well, with the exception of a few specimens which were checked by damage to the bark, caused by the trees breaking away from the stakes and rubbing on the wire guards. Two trees have been replaced, but the progress that the majority have made is quite satisfactory.

The following remarks apply to orchards planted in January and February, 1910:

Tibberton.—One hundred and fifty apple trees received from the Institute were planted on Mr. M. P. Price's estate in one orchard, in the occupation of Mr. H. J. Phelps, who bestowed every possible care in the matter of planting. I have to report a failure here in the case of Cowarne Red, which has cankered so badly that we have had to remove a number of the trees and replace them with other specimens sent from the Institute for the purpose, and these in due course will be head-worked with the above variety for the object of seeing whether it will grow free from canker when worked on an intermediate stock. With the exception of Cowarne Red the

trees have apparently got a good hold; they are being shortened back this spring, and the orchard as a whole is quite of a model character.

Dymock.—It was decided to plant 100 perry pear trees received from the Institute in February, 1910, in one orchard belonging to Mr. A. H. Chew in a district where perry pears are grown somewhat extensively. The trees received, which were strongly grown specimens, were well planted and carefully protected by Mr. Chew, and there are no failures to record. The trees appear to be taking well to the soil and situation, and there are good reasons to hope that in the future this will be one of the best and most complete perry pear orchards in the county.

Monmouth.—The following report submitted by Mr. W. J. Grant, Director of Agricultural Education, has been passed by the Monmouthshire Education Committee:

The cider and perry orchards that have been partially planted at Croesheolydd, Bassaleg, Sunny Bank, Rhiwderin, Llansaintfraed, Tre Owen, Dingestow, Itton, Tyllwyd Llangwm, and Pentwyn Llantilio Crossenny have made satisfactory progress, with the exception of the latter. The completed perry orchards at the Hendre, Old Pandy Mill, Shirenewton, and Llanddewi Court, are, with the exception of a few trees, in a very satisfactory condition. In every instance the ground has been carefully forked round the young trees, and in several cases the trees have been again well mulched with farmyard manure.

In addition to the above, eleven orchard trees have been presented this season by the National Fruit and Cider Institute to complete the planting of a small orchard at Plas Newydd, Llantarnam (Mr. L. Lawrence), and to commence the planting of a perry orchard at Old Court, Llangattock Lingoed (Mr. Warren Davies). In addition to the trees presented by the National Fruit and Cider Institute, there has been received through the Institute, from the Board of Agriculture and Fisheries, and the Bath and West Society, sufficient standard cider apple and perry pear trees to complete the planting of four orchards and to commence the planting of nine others, making a total of thirteen, which justifies the hope that in the course of a few years an addition of at least fifty acres of excellent orcharding will be added to the orchards of Monmouthshire

Devon.—Mr. C. Berry, County Instructor in Horticulture, writes as follows:—The Instructor has superintended all the work of planting and trial pruning. All the trees are on land belonging to the growers except those of Kingsnympton, where a tenant has them under his case. With regard to pruning, some trees have

been cut back hard, others to a moderate extent, and others lightly, while some have not been pruned at all.

There are 240 trees planted in five orchards. A few trees only are doing badly. Although planted in different parts of Devon and in different soils, the orchards are satisfactory up to the present. As Sir Thomas Acland suggested, there would not be much to see in them for two or more years. We secured the trees by cord and three stakes at Kingsnympton. The owner, Mr. C. Tanner, had *new* stakes cut and used direct. These stakes warped very much, in some cases the three stakes coming together at the top, thus injuring the tree-stem and breaking the cords during the first season. Before we could see the trees some little damage had occurred. "New" stakes should never be used. A few trees here will need replacing in the autumn of 1911. The trees are growing well. They have been pruned in the manner of the other orchard trees belonging to the National Fruit and Cider Institute, *i.e.*, some hard, some moderately, some lightly, and some unpruned. It is hoped to compare approximately the growth at the end of 1911, and report the same.

At Killerton, Broadclyst (Sir Thomas Acland), good stakes were used; the land has been and will be cultivated throughout as an experiment

At General Holley's orchard, Okehampton, one-third of the land is, and will be kept under cultivation. The old-fashioned straw-band was here used. In other orchards tar-twine-cord was used. The straw-bands have lasted longer and held the trees better.

It is proposed to visit all the orchards within the next fortnight to further examine and prune, if needful, any waste growth; and also during the fall to examine the crop, if any, and report.

Too much pruning of some kinds has crowded in fruit-buds; too little pruning has crowded fruit buds at the top, thus weakening the base; and so pruning of some intermediate sort seems to point to a well-balanced tree. Still, we would rather not enlarge on these appearances at present. The work has been a pleasure and will be a profit to us; the final lessons will help us.

Worcester.—The following reports have been collected by Mr. A. Weston Priestley, Director of Education:

Suckley.—Mr. J. H. W. Best writes:—The cider apple trees supplied to me by the National Fruit and Cider Institute have grown very well. I should like to point out that in future all standards intended for grass should be headed to a uniform height of 6ft. 6in. Many of those supplied to me were only 5ft. 6in. high, which is much too low for standards on grass.

Staunton.—Mr. J. E. Hawkins reports :—I am pleased to report that only one tree of those which you sent to me last year has since died, and that all the others are in an exceedingly thriving state—growing fast and looking healthy

Powick.—Mr. G. F. S. Brown reports as follows : —The trees supplied to the Powick Asylum were very satisfactory, and I was instructed to inform you that the Agricultural Sub-Committee will, in due course, prepare and send a more detailed report upon them.

Wollas Hill, Pershore.—Mr. J William Dee writes :—I am glad to say that the trees have done remarkably well. I never had stock do better.

Greenfields, Upton-on-Severn.—Mr. W. S. Lane sends the following report : —The trees are all growing well, and many of them bore a little fruit last season. I have had them somewhat severely pruned this winter so as to bring the heads to a good shape.

Madresfield.—Mr. C. de Wilson writes as follows :—The fifty trees sent from the National Fruit and Cider Institute, and planted near the Gardens here have done very well. Mr. Crump reports that there are no misses. We hope you will be able to arrange an inspection of the trees

Newnham Court, Tenbury.—Mr. E. V. V. Wheeler reports :—The trees from the National Fruit and Cider Institute planted at Newnham Court are of the following varieties : —Cherry Norman, Broadleaf Norman, Strawberry Norman, Knotted Kernel, Broadleaf Jersey, and Medaille d'Or. They are on a poor bank facing north, and towards the top of the bank the soil is shallow. All the trees are alive, but have not made much growth, and none of the trees have yet borne any fruit. The field was manured all over last year, and this year farmyard manure has been put round the trees only. I hope this will help them to make more growth. To fill up the rest of this orchard 55 more trees are required. If these can be supplied from the Institute next autumn the whole orchard would be planted with " Institute " trees. I should like two sweet varieties, 26 of one sort and 29 of another, and hope that the Institute may be able to supply them.

Moor.—Mr. Montague C. H. Taylor reports : Most of the trees are doing well, especially the pears, which were stronger stocks than the apples at the time of planting. There are a few small apple trees, rather too short in the stem for grassland, and these have not made such growth as the stronger ones. Three trees have died, death occuring soon after planting. I noticed six apple trees which had been badly attacked by scale and had been dressed with some oily preparation in the Nursery. These were hard in the bark

and hidebound ; and will not, I think, make good trees. Probab a light scraping to get rid of the old scale would do them good.

Somerset.—Mr. John Ettle, County Horticultural Instructor, ha furnished the following report :—

With the exception of a few trees mentioned below all hav done well. All the perry pear trees have grown exceptionally we out-growing the apples in each case. We are glad to see this, as u till recently there have not been, as far as we have been able t trace, any perry pears planted in the county. This is rather su prising, seeing that so many have been planted in the neighbourin county of Gloucester, as well as in Hereford and Worcester.

At Mr. H. Gibbons', Clutton, the pruning has again been attende to by his sons, who are now getting well used to the work. On variety, Kingston Black, has not done well owing to canke These will be replaced by a stronger growing variety, to be after wards head-grafted with Kingston Blacks.

With Mr. W. Masters, Barton St. David, the growth has bee very good with two exceptions, Cowarne Red and Skyrmes Kerne which, not only here but nearly everywhere, are subject to canker Some trees will have to be replaced. Barton is in one of the bes orchard districts in Somerset and the new trees, introducing a they do new blood, should eventually give excellent results.

Messrs. Tilley Bros., Shepton Mallet, have this season plante another hundred trees to fill out the orchard. All those previously planted are doing well. It will be remembered that last yea about thirty trees were destroyed by some foolish person, an were replaced. These were partly cut back last season, the alter nate ones being left without pruning till this year. Those cu back have not grown so well as the others, which has prove to be an exception to the general rule (in this county). On interesting experiment in this field will be watched carefully i years to come. It is a rather rapidly sloping field facin south, with a stream of water towards the bottom end. Tree have been planted on each side of the stream to be able t note what effect frost may have on the blossoms of varietie near running water.

The pear trees planted by Mr. Frank Boddy, at Brent Knoll are doing satisfactorily. They form a belt round three sides o a field, which is intended to be filled out with market apples.

The trees planted at Christon on Mr. House's farm and i arable soil, which was afterwards grassed down, have also take well, but not so well as some others in the county, as it wa not found possible to stake them. Mr. House has seen to th

pruning, and they will all now be staked, so that, not being blown about, they can root better. As in all the other orchards the pears have done the better. This orchard was planted last year.

Orchards Planted with Board of Agriculture and Bath and West Society Trees.

Woolston, Somerset.—Mr. C. Osborn writes:—There is not much to add to the report of last year. The trees are all doing well and growing fairly strongly, certain sorts naturally making more growth than others. We hope that the Institute will continue to advocate the planting of *new* ground, wherever possible, as we are more than ever convinced that a large number of orchards are completely worn out and ought to be let down.

Sherborne, Dorset.—Messrs. Rawlence & Squarey report:—We regret to say that four of the trees have died, one as the result of an accident being broken off, one being gnawed by a goat, and the other two apparently from no outward cause. The remainder are doing fairly well, but some of the tips of the branches are dead. Since the orchard is near the river Yeo, we fear that some of the late frosts last year may have caused this.

Butleigh, Somerset.—Mr. T. Carter sends the following report: The trees from the Institute were planted in November, 1908, in old orchards, and are doing very well. Those of a more vigorous habit of growth are, of course, looking the best. In planting, holes were made about 1ft. deep and 6ft. in diameter, and a cart-load of fresh soil placed in each. The surface is kept broken for a radius of 3 or 4 feet around each tree. As compared with trees of the same age of our own raising, there is a marked difference, especially in those of weaker growth. We work all our trees on the Morgan Sweet stock, thus obtaining a stronger stem and correspondingly strong head growth. It remains to be seen how the cropping qualities will compare.

Frampton Cotterell.—Mr. J. P. Eley writes as follows:—I beg to report that the fruit trees which were supplied from the nursery of your Institute are going on very satisfactorily. They were planted in the season of 1909-10, and I think that only one tree is dead out of the hundred which I planted. Doubtless that can be accounted for in a great measure to the favourable season last year; but probably the system of planting which you recommend has also a good deal to do with it. The trees were pruned in, or about, the early part of May, and they made a fair amount of wood, particularly some varieties, considering that it was the first year.

Aspall Hall, Suffolk.—Mr. J. B.Chevallier's report is as follows: The trees from the Cider Institute, as well as the trees in the older part of the Orchard, made good growth during 1910. They were attacked by Aphis early in the spring, and were sprayed with Herrod's "Aphis Wash." Later Apple Scab was found to be present, but there being no fruit, treatment was not considered necessary at that time.

1910 was a very poor apple year, but other smaller fruits between the trees yielded an average crop In December the younger part of the orchard received a dressing of Basic Slag (10 cwt. per acre), and Superphosphate (5 cwt.); while the older part was treated with Quicklime (20 cwt. per acre), and Superphosphate (5 cwt.).

In February, 1911, the trees were sprayed with Sodalin and Sulphate of Copper, to be followed, just before the blossom opens, with Herrod's "Apple Scab Wash."

Harper-Adams College, Newport, Shropshire.—Principal P. Hedworth Foulkes, B.Sc., has sent the following report:—The cider and perry trees received from the Board of Agriculture made good progress during the year 1910. Growth was strong and the wood ripened well. The trees were sprayed in January with Caustic Winter Wash, and in March with Bordeaux Mixture. No trace of insect or fungus pests has yet been on them. One tree was damaged by rabbits, but it is now recovering. A few fruits were produced on some of the trees, and nearly all are now furnished with fruit spurs. The ground on which the trees are growing is a good loam, and was cropped with cabbage, lupins, sorghum, soya bean, and other forage crops.

Loders, Dorset.—The report of Mr E. C. Parslow, County Instructor in Horticulture, is as follows:—The majority of the trees are now well established, and making satisfactory growth, with the exception of Foxwhelp, which has made little or no growth since planting. I can only attribute this to the probable influence of the stock. There is a tendency to canker in many of the trees, for which H. Emulsion has been applied. Although it is too soon to say definitely, it seems that the Emulsion is likely to prove useful in holding the disease in check. The trees were well pruned in 1909 and 1910, and have this Spring been lightly pruned only; several branches in the centre of the trees that would ultimately be out of place and result in crowding have been left in for another season or so. The trees are becoming a most valuable object lesson locally, and present a striking difference to the majority of young apple trees in the Dorset orchards.

APPENDIX E.—New Experimental Orchards Planted in 1910-11.

CENTRE.	VARIETIES SELECTED.			
	APPLES.			PEARS.
	Sharp.	Sweet.	Bittersweet.	
Hereford County Trees.				
Berrington and Eye	Kingston Black (5) Hardwicke (5) Yeovil Sour (5)	Eggleton Styre (5) Improved Pound (5)	Chisel Jersey (5) Dabinett (5) Philip Norman (5) Yarlington Mill (5)	Oldfield (10) Taynton Squash (10)
Somerset County Trees.				
Shepton Mallet ..	Foxwhelp (1) Northwood (3) Redstreak (1) Yeovil Sour (5) Kingston Black (5) Victoria (2)	Broadleaf Norman (5) Killerton Sweet (4) Sweet Alford (2) White Alphington (3) Northwood (3)	Bramtot (4) Butleigh No. 14 (3) Medaille d'Or (7) No. 32 (3) White Bache (1) Chevallier (1)	Barland (10) Moorcroft (10) Oldfield (15) Taynton Squash (15)
Board of Agriculture Trees				
Abergavenny (Monmouth) ..				Barland (5) Huffcap (5) Oldfield (15) Taynton Squash (15)
Llantarnam (Monmouth).. ..	Kingston Black (3)		Cherry Norman (5) Brown Jersey (5) Yarlington Mill (5) Virgin Mary (4) Dove (4)	